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6<sup>D</sup>

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## Editorial

AS time goes on, the distance between one Christmas and the next seems to shrink and dwindle at an alarming rate. It is, of course, understandable, as time is only a relative matter, and there is so much in the world today to speed our thoughts and our way of living.

We are in fact, rapidly approaching that state when the human race may well divide itself into two groups—those who can keep pace with modern thought and knowledge, and those who cannot.

The gap between the average man and the scientist has never been greater than it is today. This is the inevitable result of knowing more things, which obviously take longer to assimilate, and much more effort to apply. The sum total of scientific knowledge 100 years ago would be considered elementary by the well-informed student of today.

We have seen during the year how great is the influence of the man of science. He is at the moment the most valued asset of any nation. For he can create life and destroy it, he can bridge distance and control the elements, he can make rain, and change night into day.

In a world so raked with conflict, hunger and misery, he is a king pin. With the aid of his knowledge, and with the things he can make, some solution to all these problems is possible. Without them, there is nothing ahead but chaos and death.

That is the significance of keeping abreast of modern thought and knowledge. It is a truism to say that every power has the potentiality for good or evil. It is much more realistic at the moment to say that we have now a host of things which can mean either life or death to the whole world. Such a statement no longer belongs to Jules Verne or H. G. Wells. It isn't taken from an adventure strip. It is just plain fact, and so far, we only know the half of it. The full extent to which the scientist may now influence the ingredients of war and peace still lies behind locked doors.

Is it too much to ask that the human race will make an effort to keep pace with knowledge? No more deadly indictment of our failure to match our new knowledge with desire to make good use of it could be found than in the statements of so many scientists themselves, who would rather shut up their laboratories than produce further marvels to be distorted and abused by those who make war on each other.

That is what I mean when I say that our average level of thought is lagging a long way behind the powers we command.

Whatever your ideas about Christmas may be, and of the story that goes with it, we cannot escape the conclusion that ideals of unselfishness, service, and goodwill towards men are necessary elements in our design for the future. Without them, it is hard to see very far ahead before our eyes may lose the way in a dangerous and fearful fog of possibilities. With them, what can we not do?

Let that be our hope for the future, our hope for mankind, our hope for the world, at this time. May Christmas, 1947, see us some way along the road.

*John Moyle*

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A brief selection from our large range of radio publications.

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An authoritative 1-volume self-study training course in practical repair of all types of home and vehicular radio receivers by the most advanced, expert methods. Thorough explanation of radio test instruments, trouble shooting procedure, etc. Over 700 helpful illustrations.

#### ● PHILIPS MANUAL OF RADIO PRACTICE, Beard. 22/6 (10d).

Every radio service engineer and technician must keep up-to-date in technical knowledge and this manual is specially designed to do this.

#### ● RADIO DATA SHEETS, Beatty. 10/- (4d).

A series of Abas providing most of the essential data required in receiver design.

#### ● TECHNICAL TOPICS RADIO HANDBOOK. 7/6 (6d).

In addition to the practical aspect of servicing an attempt has been made to keep the reader fully acquainted with the trend of modern progress and further, numerous articles dealing with radio theory have been prepared for the guidance of those requiring basic information.

#### ● RADIO VALVE DATA POCKET BOOK. 7/9 (3d).

Apart from valve connections this book contains a good deal of matter relevant to valves, including the reading and plotting of characteristic curves, valve symbols, a glossary of valve terms and dimensions of valve bases.

#### ● RADIO ENGINEERS POCKET BOOK. 5/6 (3d).

Produced to meet the needs of all those engaged in the various branches of radio—Service Engineers, Students, Circuit Designers, Radio Operators, Transmitters, Constructors and Manufacturers.

#### ● WIRELESS SERVICING MANUAL. Cocking. 12/- (4d).

Deals with the location and cure of the 101 defects which can develop in receiver and its associated equipment.

#### ● REFERENCE DATA FOR RADIO ENGINEERS, 2nd. edition, Federal Telephone and Radio Corporation. 18/- (7d).

Presented as an aid in the fields of research, development, production, operation and education. Invaluable to all radio men.

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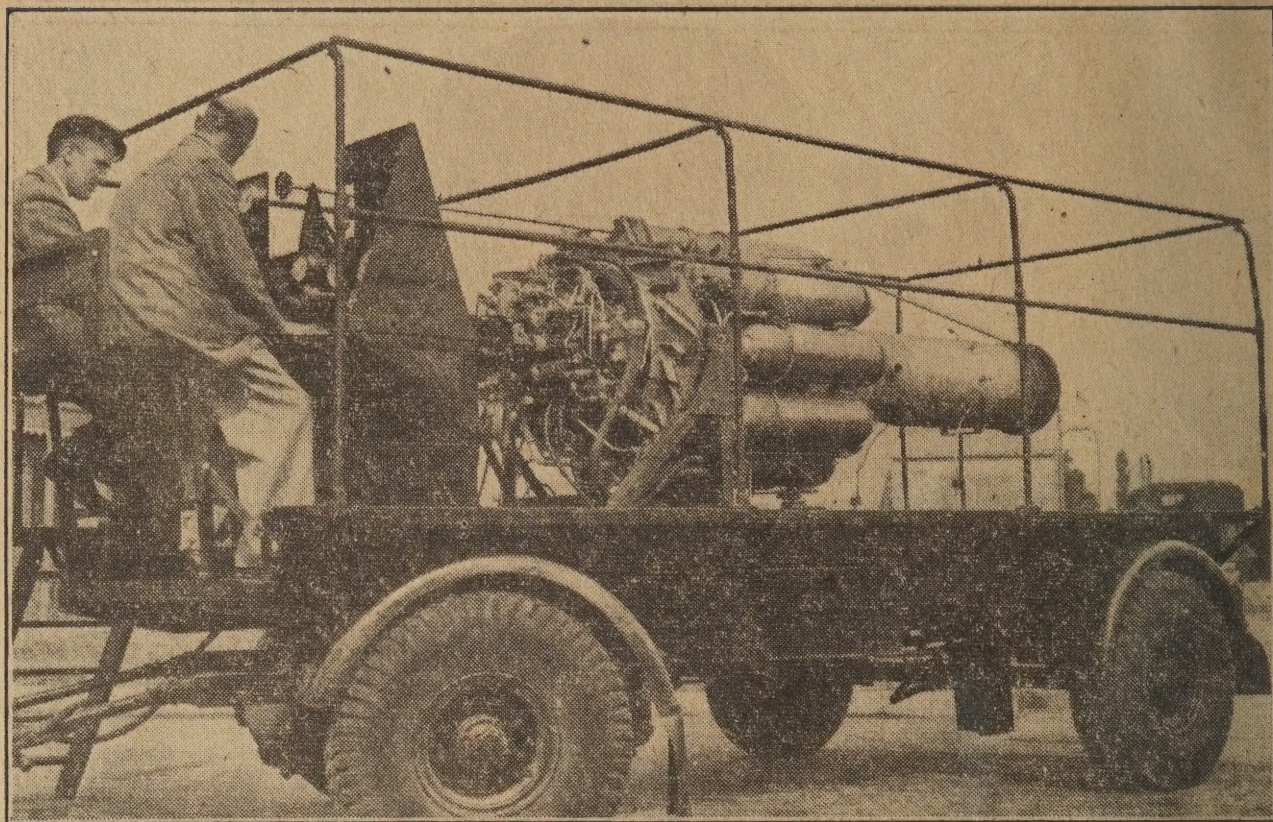
# A GAS TURBINE BLADE TAKES SHAPE



The power of the gas turbine depends largely upon numbers of curved blades which operate the turbine rotor at high speed. The blades are accurately made and highly finished. This operator is putting the final touches to the die-block, which is made of Nymonic 80 steel. About 1000 blades can be made from this die. Overleaf, Charles Gardiner, BBC correspondent, tells the story of Whittle's gas turbine, its development and application as a general source of power.



# BRITAIN AHEAD WITH GAS TURBINE



Here's a completed gas turbine mounted on a mobile test unit on which its performance can be checked.

If evidence were needed that within the next two decades the gas turbine engine is going to be the most important prime-mover on land, sea and air, it is to be found at Britain's National Gas Turbine Establishment. Here engineers and scientists have produced gas turbines for all purposes.

**T**HREE years before World War II started, a brilliant young Royal Air Force officer named Frank Whittle was haunting Air Ministry corridors trying to convince his seniors that a practical method of building a gas turbine engine for aircraft had been found.

## POWER JETS LIMITED

Whittle was no stranger to those dusty corridors—he had been peddling the gas turbine idea along them for some years, and by 1936 he already had certain basic patents, and there were signs that interest was at last stirring in high places. Later that year Whittle, certain that he was on the right lines, formed a company called "Power Jets Ltd.," and, in 1937, the long-awaited Government backing for the project was given.

At this time Whittle was working near Lutterworth, a sleepy Leicestershire market town, whose only claim to fame was that John Wycliffe was its one-time vicar. The locals naturally gossiped about the unrural com-

munity which had now come to live and drink at the town's main hostelry, and there were many and varied guesses as to what "they gennelmen were up to."

But all the guesses were wrong—and it was not until the end of the war that Lutterworth realised the whole future of world aviation had been altered by that little team of scientists who played darts and drank beer in the pub night after night and who vanished every morning in a varied collection of rather rickety motor-cars.

The place they vanished to was an old disused foundry about five miles

out of Lutterworth, and adjacent to another and even sleepier Leicestershire village called Whetstone, a place which isn't even marked on many of Britain's road maps. It was in this foundry that Whittle's first successful jet engines ran, and from it went forth, in 1942, the motor which powered the now historic single-seat E/28 Gloster on Britain's first jet propelled flight.

That was five short years ago.

## HUGE FACTORY

Today, at Whetstone, on the site of Whittle's foundry, there exists the huge factory which is Britain's National Gas Turbine Establishment.

It is, I suppose, an unique establishment in that there is nothing like it anywhere else in the world, and it's fantastically expensive test apparatus, and its teams of scientists and engineers would be beyond the purse of any one commercial firm, certainly in Britain, and, I should imagine, anywhere else as well.

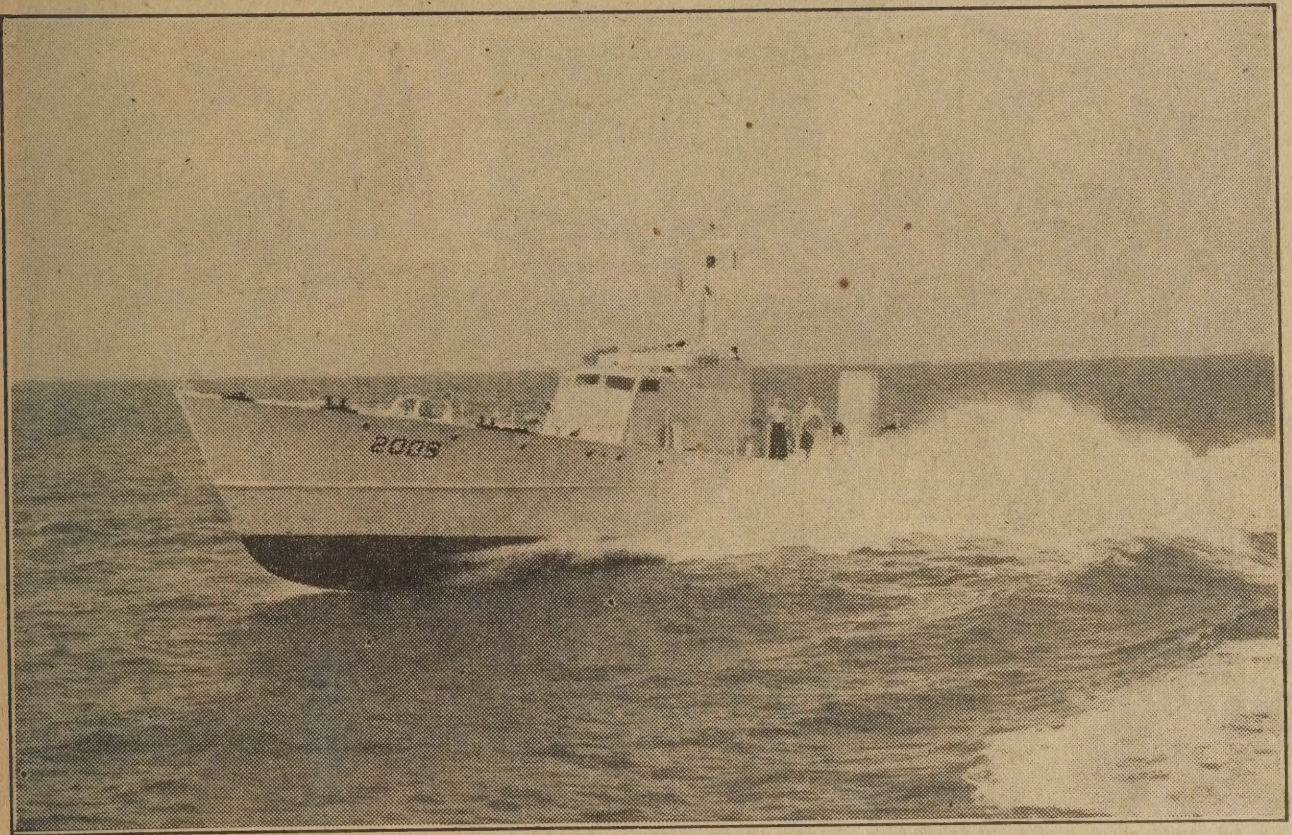
I have just visited the NGTE, and

**by Charles  
Gardiner**

Air Correspondent to the B.B.C.



# POWER GENERATOR OF THE FUTURE



The first vessel to be propelled by a gas turbine—the Royal Navy's MTB 2009. It has extremely good performance with low vibration.

I can sum up my impressions in one sentence: It is obvious that within the next two decades the gas turbine engine is going to be the most important prime-mover on land, sea and air.

Allowing for the natural enthusiasm of Whetstone's experts, the hard facts and figures with which they support their case are incontrovertible.

The dominating application of the gas turbine to aviation is now common knowledge. Every new fighter and bomber, and every projected big airliner is looking to jet propulsion in one form or another for its power. Only the slow weight-lifting freighters, the feeder-line aircraft and light personal aircraft are remaining faithful to the piston engine—and future developments may put even these machines into the jet category before many years have gone.

## OTHER USES

But jets are not going to be content with merely dominating aviation. Whetstone is today working on plans for gas turbines for electrical generating plants, locomotives, and ships—and, indeed, for almost every purpose for which the world now uses either steam turbines or piston engines. Two British gas turbine railway engines are already being built; jet boats have already made their appearance, and

the Swiss have installed gas turbine generating gear. Even the day of the jet motor-car is not ruled out by engineers who maintain that in the past they have tackled and overcome bigger problems than that.

In other words, the jet age is coming upon us—and the new Whetstone may yet revolutionise our daily lives just as Whittle's old Whetstone foundry has changed the world's concept of flying.

## TURBINE, NOT JET

I had better explain here that the gas turbine as applied to industry and to land and sea travel will not be a "jet" engine like that in the Meteor and Vampire fighters. It will not eject high-powered and exceedingly high temperature gases in a searing blast. It will, in fact, have no more inconvenient an exhaust than that of an ordinary heavy oil or petrol motor. In the industrial gas turbine, that red-hot rush of compressed air which comes from the combustion chambers will be harnessed to drive extra turbines and shafting—almost as it is harnessed today to drive a propeller in the jet prop type of aero engine. In short, the non-aviation gas turbines will be real turbines, and will not be "jets." It would, in fact, be wrong even to call them jets, since they will have no jet at all, but mere-

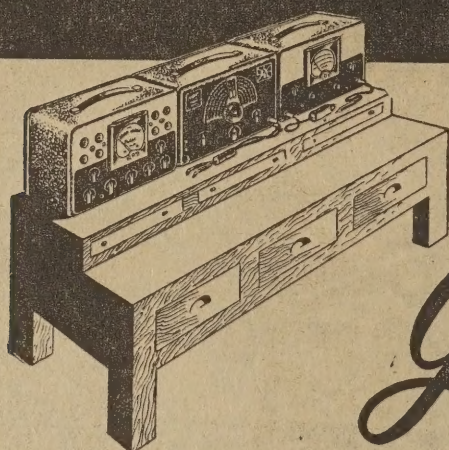
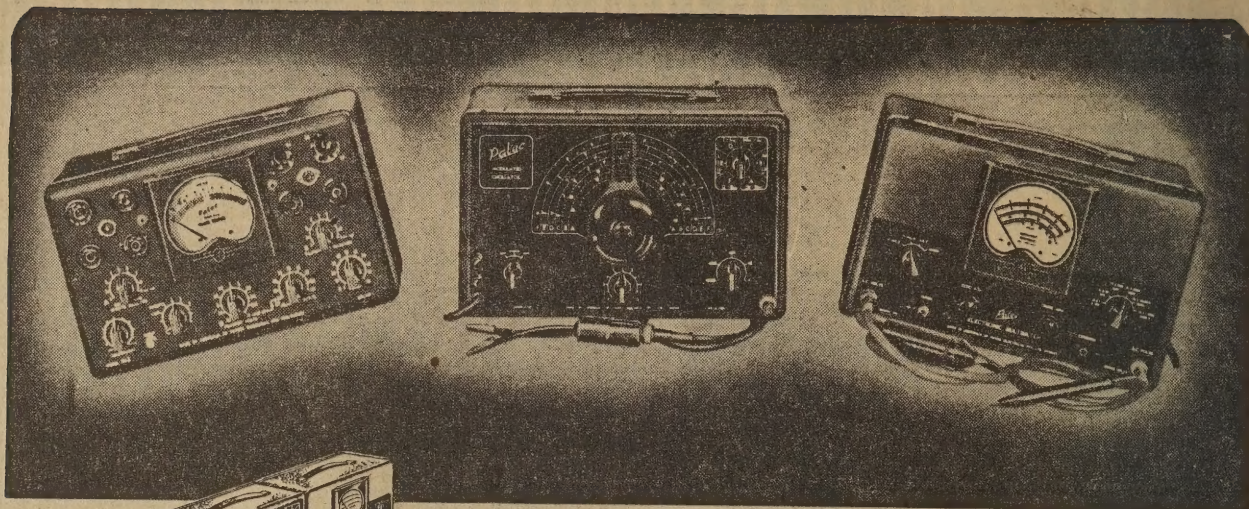
ly a quiet, docile and thoroughly normal exhaust. In high speed aviation, the "jet" arrangement is the best because it provides sheer thrust in the simplest possible manner. Air is compressed up to a ratio of four to one or even higher, and then flung through combustion chambers, which are kept up to a heat of around 1000 degrees centigrade. This journey through hell expands the air and increases its velocity, after which it is allowed to escape through the jet type at enormous speed. As the hot air presses back—the aircraft in which the jet engine is mounted, is naturally pressed forward, and the old basic law that action and reaction are equal and opposite is duly honored.

In fact, there is only a turbine at all in an aero-motor so that some means is provided of driving that air compressor which has started the whole business off. This turbine is installed just before the jet pipe so that the escaping air drives it round on its way out.

## ENCASING AIR FLOW

For industrial and all non-aviation purposes, this arrangement is obviously no good. You can't have red hot air streams playing around in the factory, on the railways or in the harbors. The answer, therefore, is to encase the air flow, and make it drive





THESE three essential units make an impressive showing and supply complete coverage for the quick and effective diagnosis of all radio problems. They also have the advantage of being individually self-contained and readily portable for outside service. Do more and better service in the competitive days ahead. Do it quicker, more profitably!

# Goodbye TO GUESSWORK!

## THE PALEC VALVE TESTER, MODEL ET-3

This compact, efficient valve tester, the latest model in the new series of Palec test instruments, is eminently suited for workshop, counter or portable use.

### FEATURES:

**Good for years to come.** Selection of filament pins, irrespective of position on base, with full floating element selector switch—only one socket for each valve type necessary. Takes standard American valves, 7-pin button base and P and V Continental.

**Wide Heater Voltage Range.** Inbuilt filament transformer covers all filament voltages from 0.6 (deaf aid series) to 117 volts, catering for all overseas and local valves.

**Neon Shorts Test.** To conform with valve manufacturers' recommendation, comparatively low voltage is employed (50 volts max.) for this test. This prevents danger of short developing between grid and filament due to electrostatic attraction where normal striking voltage of the neon is applied to valve elements. Particularly applies to testing of 1.4 volt range of valves and is an exclusive feature.

**General.** Complete valve data booklet supplied, listing over 800 valves. Price: £19/10/6, plus tax.

## MODEL M.O. MODULATED OSCILLATOR

Range, 15 K/cs—30 M/cs in six direct reading bands.

Vernier Dial 54:1 ratio, calibration accuracy 1%.

Has cathode follower to prevent frequency modulation and attenuator reaction.

Signal generator pattern attenuator of five steps: impedance 11 ohms on lower settings.

Triple shielding and adequate filtering ensures a leakage of less than 1 micro-volt at all frequencies.

Supplied complete with detachable dummy antenna, co-axial leads and 24-page instruction book.

Price: £32/17/6, plus tax.

**Note: Each of these instruments is A.C. operated, 200-260 volts, 50 C.P.S., and can be operated from a battery by using external vibrator unit.**

Price: £4/17/6, plus tax.

**All prices are nett trade and plus tax. Subject to alteration without notice.**

**Available at leading wholesalers in all States.**

## PALEC Model V.T.M. (Probe) MULTIMETER

Ranks as most versatile and valuable single piece of test apparatus.

Checks and tests all circuits, R.F., A.F., A.V.C., under operating conditions without disturbance.

Capable of quickly locating most obscure and elusive of intermittent, noisy, open or short circuits.

Checks all component parts and tests for high resistance insulation leaks.

Used with Model M.O. oscillator or equivalent, traces signal and determines stage gain in every channel from mixer to speaker.

**Note:** Oscillator employed must have good attenuator characteristics. **Ranges:**

(1) R.F.-A.F. six-range voltmeter: 0-2.5-10-25-100-250-1,000 volts A.C. Fitted with polystyrene bushed probe operating on frequencies up to 300 M.C. accuracy  $\pm 0.5$  db. to 100 M.C. Input cap., 10 unf., loading equal to 6 megohms.

(2) High resistance D.C. six-range voltmeter: 0-2.5-10-25-100-250-1,000 volts D.C. Total load 11 megohms—giving over 4 megohms per volt on lowest range.

(3) Ohmmeter, six-range—from 0.5 ohms to 1,000 megohms.

Detachable co-axial leads, 20-page instruction book supplied. Employs 4 valves. Price: £29/10/6, plus tax.



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P.18.FP



turbines and machinery until all its energy is exhausted.

Today, Whetstone is at work on plans to fit these "encased" engines to every form of industrial activity.

They have a good case.

The gas turbine is much more efficient than steam or petrol—and costs much less to install. Furthermore, a gas turbine can be started up at the touch of a button, while a big steam plant needs three hours of "stoking up" before the wheels begin to turn. Already a gas turbine generating plant of 15,000 kilowatts has been designed and its usefulness as a standby at peak load electricity times is obvious. It can be put on or off in a minute, with no waste of fuel.

### FUEL CONSUMPTION

The big snag with the present units is the fuel consumption—but the Whetstone scientists are certain they will reduce this high running cost until it is less than that of coal for modern steam plants. Already gas turbines have run well on crude oils, and eventually they will be designed to burn powdered coal.

The gas turbine age is no pipe dream, either. It is likely to be with us quite soon. After all—in 1937 there was no such thing as a working jet engine—but in 1947 no important aircraft is being planned to use any thing else.

In 1957?—well, that's up to Whetstone—and they seem optimistic enough.

## RADAR BEACON

A SMALL radar beacon for light-houses, emitting signals which will be detected by radar-equipped ships, has been built by General Electric for the United States Coast Guard. It was tested at special demonstrations of merchant marine navigation aids in May at New London, Conn.

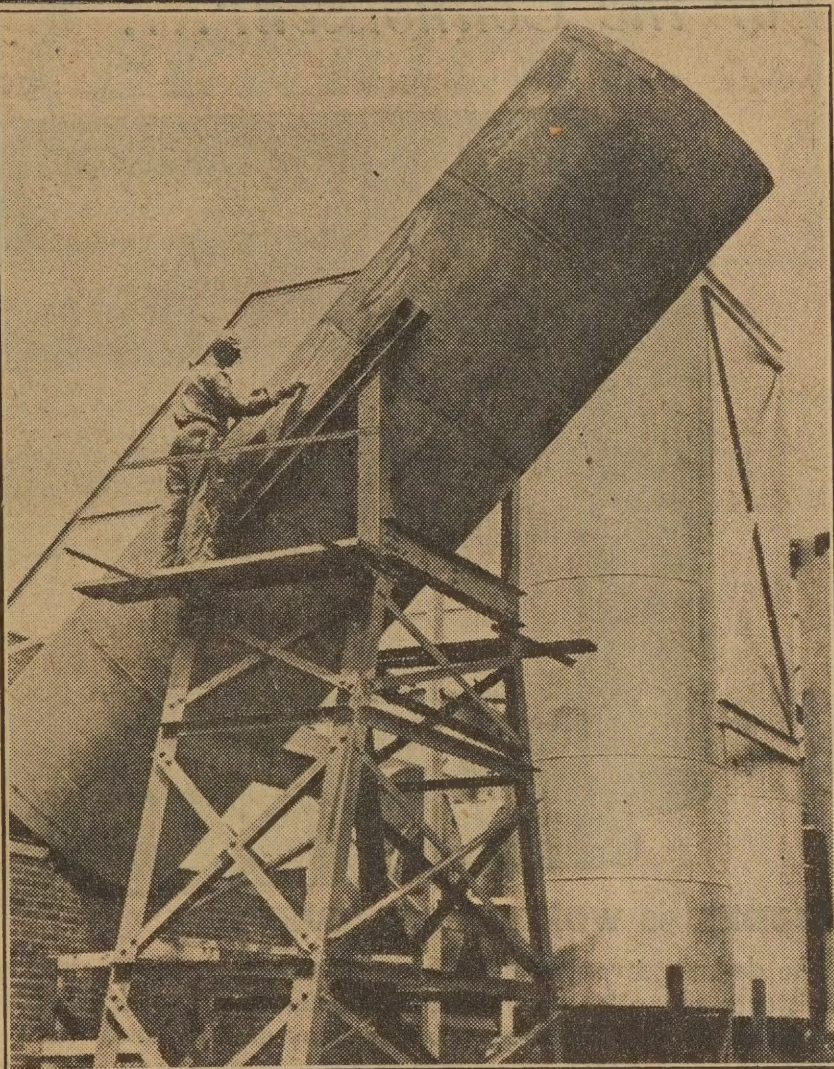
The unit should prove useful during periods of fog, rain, snow and sleet, when normal sight and sound warnings are limited.

Signals from the electronic beacon will appear as a bright ray on the radar's indicator, showing the exact direction of the beacon, in the same way that the conventional lighthouse is located by the beam of light it emits.

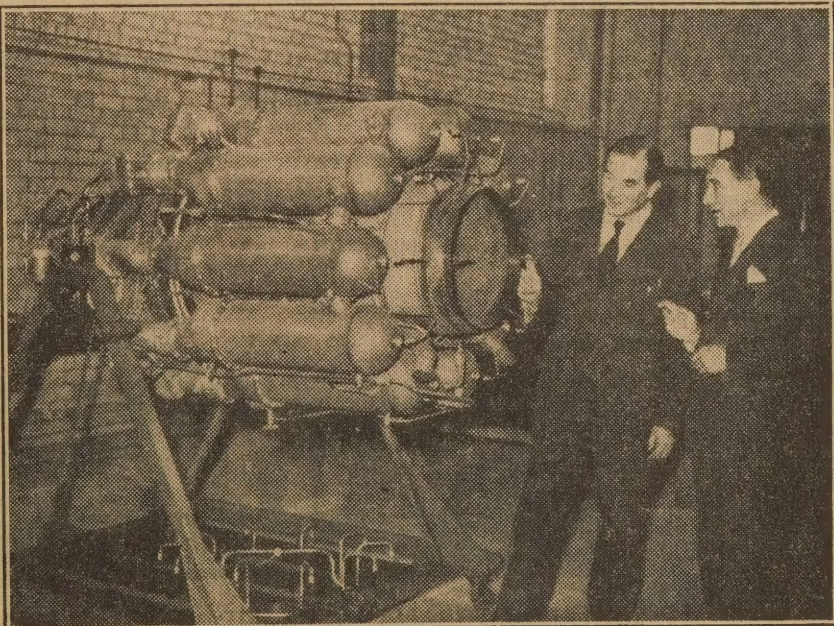
Use of such radar beacons would also aid radar navigation, especially on coast lines where the surfaces are flat and give a poor radar reflection on the screen of existing equipment. Several units in lighthouses on the coast would also give the navigator a triangular fix and act as an accurate position-indicator.

The transmitter, oddly enough, uses a lighthouse tube operating at 3200 megacycles. This feeds into an omnidirectional vertical dipole antenna that resembles a policeman's night-stick in appearance.

## SILENCER FOR JET ENGINES



Repainting one of six exhaust silencers at the jet-engine laboratories of the GE Co. in Lynn, Mass., USA. Each silencer is 40ft. high and 5ft. in diameter. Without them, engine row could be hard for miles.



Rear end of a Whittle turbo jet being inspected by Arthur Woodburn and Dr. Ronbe Cox, who is in charge of the National Gas Turbine establishment.



*For the Connoisseur....*



## MODEL 98 WORLD EXPLORER

The de-Luxe seven valve 98 is an allwave A.C. superheterodyne designed especially for long distance reception on shortwave, medium and broadcast wave bands. Engineered to a fine degree of precision and including many new technical features, this receiver is an outstanding example of Mullard reputation for high quality of design and performance.

### SPECIFICATIONS

**CIRCUIT.** 6-valve Superheterodyne with magic eye tuning for A.C. mains, 110-260 volts, 40-60 cycles, with the following Mullard Valves. 6U7G—R.F. Amplifier: ECH35—Frequency Changer: 6U7G—I.F. Amplifier: 6B6G—Detector and A.V.C.: 6V6G—Output: 5Y3G Rectifier: EM4—Tuning Indicator.

**WAVE-BAND COVERAGE.** Short-wave 13-42 metres, 22-6.5 Mc/s: Medium 42-160 metres 6.5-1.82 Mc/s: Broadcast 160-550 metres 1860-540 Kc/s. To facilitate Station selection a vernier tuning control is fitted.

**REPRODUCTION.** A special 8-inch electrodynamic speaker with low note flare ensures high sensitivity and fidelity. The inverse feedback has been specially arranged to extend base reproduction made possible by the large baffle area incorporated in the cabinet.

**SENSITIVITY.** Combined with high gain coils and I.F. transformers, the special ECH35 Frequency Changers gives overall sensitivity of particularly high order.

**AUTOMATIC VOLUME CONTROL.** Delayed A.V.C. circuit has been especially designed to minimise fading under difficult conditions.

**DIAL.** The illuminated horizontal tuning dial shows both frequency and wave length, and combined with the line of light station indicator enables very fine adjustments to be made on distant stations.

**TUNING INDICATOR.** Correct tuning is ensured by the provision of a Cathode Ray Tuning Indicator, with the double sensitivity feature.

**EXTENSION SPEAKER.** Provision is made for the use of an extension speaker of the low ohmage permag. type, which may be operated in other parts of the home.

**GRAMOPHONE REPRODUCTION.** Provision is made for the use of a Radio Gramophone pickup, which enables the high fidelity audio channel to be used to maximum advantage.

**POWER SWITCH.** An Off/On Power Switch is incorporated which obviates the necessity of the listener having to operate the power point switch.

**TONE CONTROL.** A continually variable tone control is particularly effective on both broadcast and short-waves.

**CABINET.** Beautifully finished cabinet of modern design, incorporates imported veneers.

Dimensions—Height 16in. Length 23½in. Depth 11in.

# Mullard

*Write for illustrated brochure of this superb Receiver.*

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# Technical Review

## NEW INSTRUMENT MEASURES VISIBILITY

It is now possible to measure and record accurately the light transmission qualities of the atmosphere, instead of having to rely on visual observation and weather statistics. A powerful light beam, a phototube and more or less standard amplifier are the basis of this new instrument.

**I**N every test of the effectiveness of a concealment measure, or of the visibility of a light signal, the light transmission of the atmosphere is a vital element. Frequently the transmission varies so rapidly that the effects of all other variables, including those under study, are obscured.

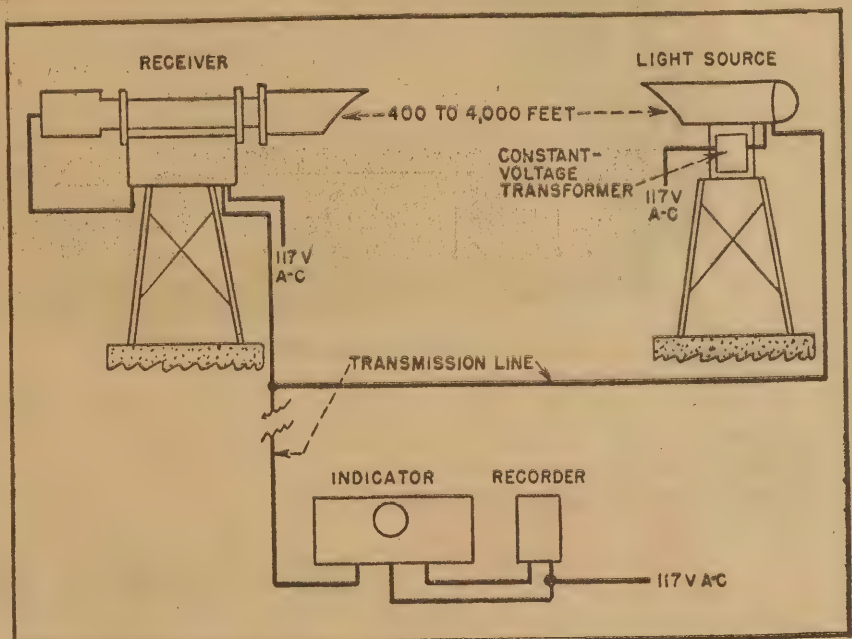
Many thousands of man-hours have been wasted in visibility tests by attempts to take account of atmospheric transmission merely by the visual estimates stated in such terms as foggy, hazy, or clear. At present, visibility data in the proximity of airports—so important in safe aircraft operation—is obtained by such periodic visual observation.

To eliminate or reduce the human factor in visual estimation, particularly in foggy weather, the US National Bureau of Standards has developed an electronic instrument, the transmissometer, which measures accurately and continuously the light transmission between two fixed points.

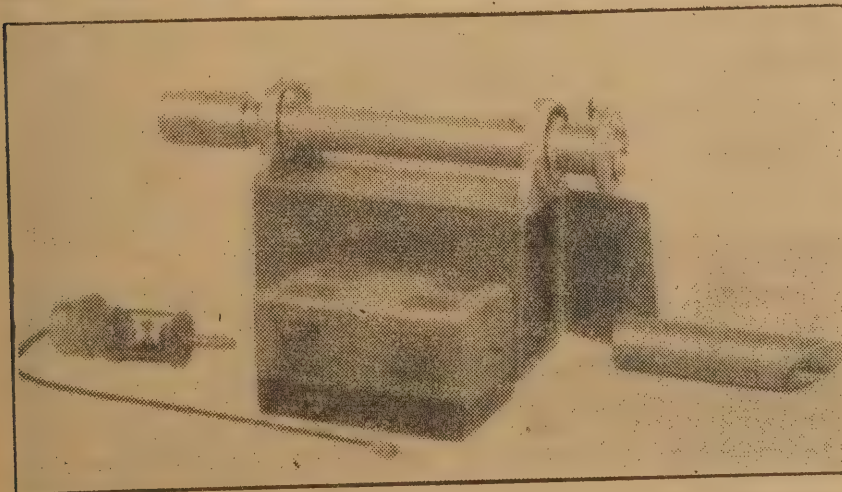
The transmissometer consists of a light source, a phototube receiver, an amplifier and an indicator. The distance between the light source and receiver may be varied, depending on

the particular application; distances up to 4000 feet have been used.

The amount of light falling on the receiver from the constant-intensity light source is determined by the haze or fog density between the two points. The output of the receiver is trans-



Illustrating the arrangement of the transmissometer components. The indicator and recorder can be placed anywhere within ten miles of the light source and receiver.



The 350,000 candle power light source, transformer and clock switch that shuts off the light for calibration purposes once every hour.

mitted to the indicator, which may be placed at a control station as much as several miles from the light source and receiver.

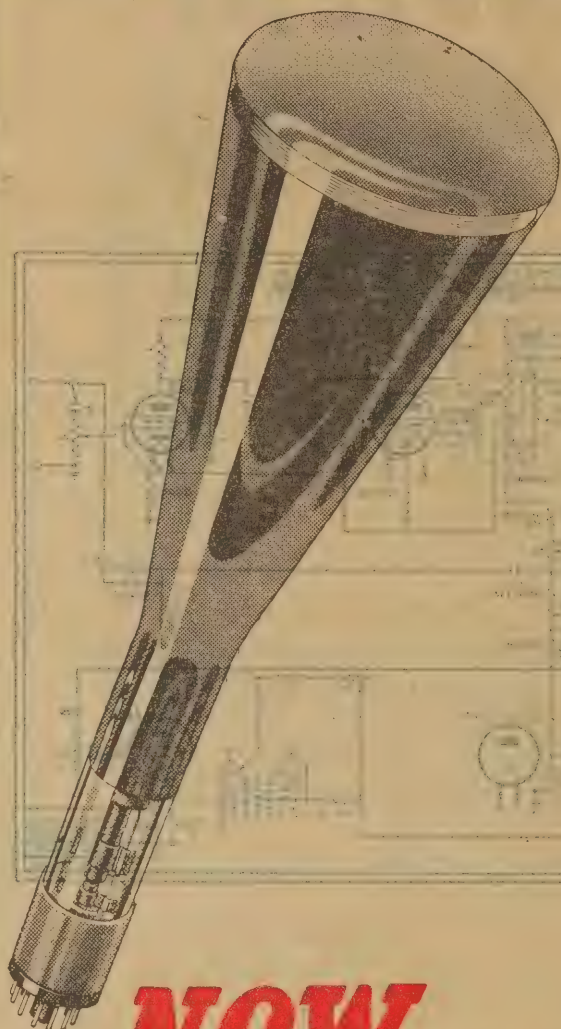
A 6-volt sealed-reflector lamp constitutes the 350,000-candlepower light source, which differs from a sealed-beam headlight only in its cover and filament. The intensity of the light is closely controlled by a voltage-regulating transformer, insuring a light output substantially independent of line voltage. Adjustments of the intensity are made by means of a series rheostat.

For a zero check of the transmissometer the light is turned off automatically once an hour, while intermediate zero checks may be made by the operator from the indicator several miles away. Burning continuously, the lamp has an expected service life of three to six months.



# RADIOTRON

# 5BP1



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RCA-5BP1 is a cathode-ray tube of the electrostatic deflection and electrostatic focus type with a medium-persistence screen four and one-half inches in diameter. The brilliant luminous spot is suitable for the observation and photography of transient and recurrent phenomena.

*Other Cathode-ray tubes available:*

Type 4201 6in. screen	£1/17/6
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Type VCR112 5in. screen	£1/10/-
Type VCR516 12in. screen	£1/10/-
Type 913 lin. screen	17/6

(Plus 10% Sales Tax.)

**Stocks immediately available—normal trade discounts apply**

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# NOVEL SPACE-CHARGE TETRODE OUTPUT VALVE

Low harmonic distortion is obtained from a new output tetrode in which the first grid is made positive, acting as a space-charge grid, and the second grid is used as the control electrode. The tube is little affected by changes in load impedance and is comparable to a pentode in power sensitivity.

**L**OW distortion can be obtained from a space-charge grid power tube. In such a tube the first grid is operated positively to produce a virtual cathode. The second grid is the control grid.

An experimental tube designed to operate in this manner gave 2.4 watts of audio output into a 7500 ohm load with only 1.5 per cent. total distortion. This distortion is lower, but the power sensitivity is less than the same quantities in a typical beam-power tube.

Some years ago, a space-charge grid power tube was experimentally developed with the intention of produc-

In operation the first grid is made positive with respect to the cathode; its effect is to counteract the negative space charge and to produce a cloud of electrons at the plane of the first grid. This cloud acts as the virtual cathode.

The operation of such a tube is similar to that of a triode with a large effective cathode area, behaving as if it were temperature limited. The second grid is then the control electrode. Screens and suppressors can be added, but as their effect will be, among others, to increase the dynamic plate resistance, which is undesirable

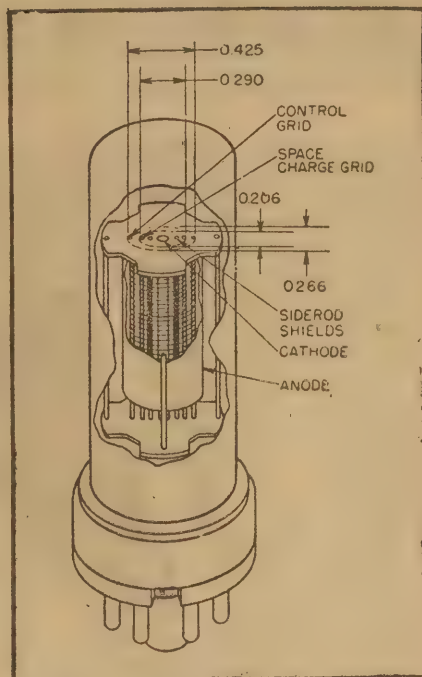


Fig. 1.—Experimental space-charge grid power output tetrode dimensions.

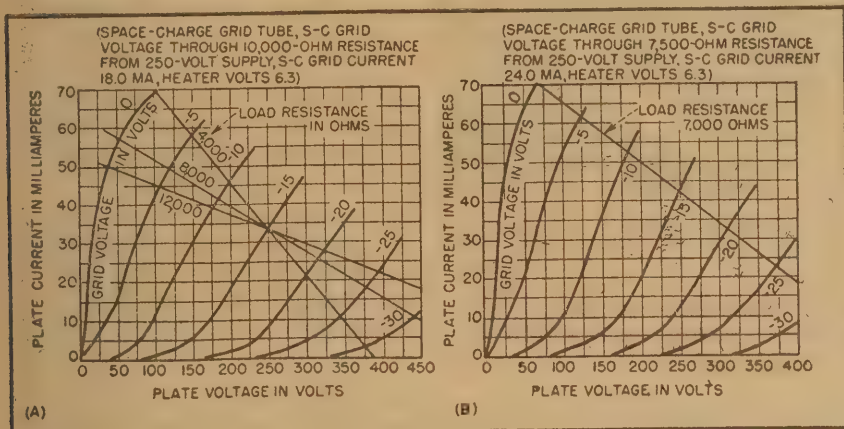


Fig. 2.—Plate characteristics of space-charge grid tetrodes are similar to those of a triode.

ing a tube having low distortion and high power sensitivity.

Although the tube that was developed does not have the high power output available from the 6V6 beam power tube, no commercially available tetrode or pentode power tube has as low an order of distortion as does this experimental space-charge grid tube.

In conventional tubes, the power output and, more especially, the harmonic distortion, are greatly affected by load impedance. Inasmuch as these tubes are used to drive loudspeakers, whose impedances vary widely with frequency, frequency distortion is also present.

In the case of triodes, the second-harmonic distortion increases with decreasing load impedance. Pentode loads are chosen to give a compromise between high output and low third harmonics; load variations affect both factors.

Figure 1 shows the construction and typical dimensions of a tube designed for space-charge grid operation. Tubes not designed for this type of operation are unsuited to it because the space-charge grid draws excessive current.

in power output tubes driving loudspeakers, they were not used in the experimental tube.

To reduce the space-charge grid current, two side rods were introduced between the cathode and the supports of the space-charged grid. These side rods could be electrically connected to either the cathode or the

control grid. By thus restricting the path of electrons to the vicinity of the lateral wires of the space-charge grid, its current was reduced about two-thirds.

Figure 2 shows the characteristics of a space-charge grid tube operating at 6.3 volts and 0.7 ampere on the heater, the space-charge grid supplied from a 250-volt supply through a 10,000 ohm resistor—giving an average space-charge grid potential of 70 volts, and an average current of 18 ma, the plate supplied from the 250-volt supply through a 7500 ohm load, and the control-grid bias at -15 volts—giving a plate current of 33 ma. Power output under these conditions is 2.4 watts with less than 1.5 per cent. total distortion. Varying the load from 5000 to 12,000 ohms does not increase the total distortion to over five per cent.

## SHUNT-FED WING ANTENNA

**A** NEW system, of external antenna wiring for airplanes which will help to eliminate radio static under inclement weather conditions has been announced by Air Material Command engineers at Wright Field.

Present exterior antennae interrupt the sleek contours of airplanes designed for supersonic speeds, increase the drag which cuts down the speed, and present protruding surfaces which tend to pick up ice in icing conditions. Because of this it has become necessary to devise new types of radio antennae.

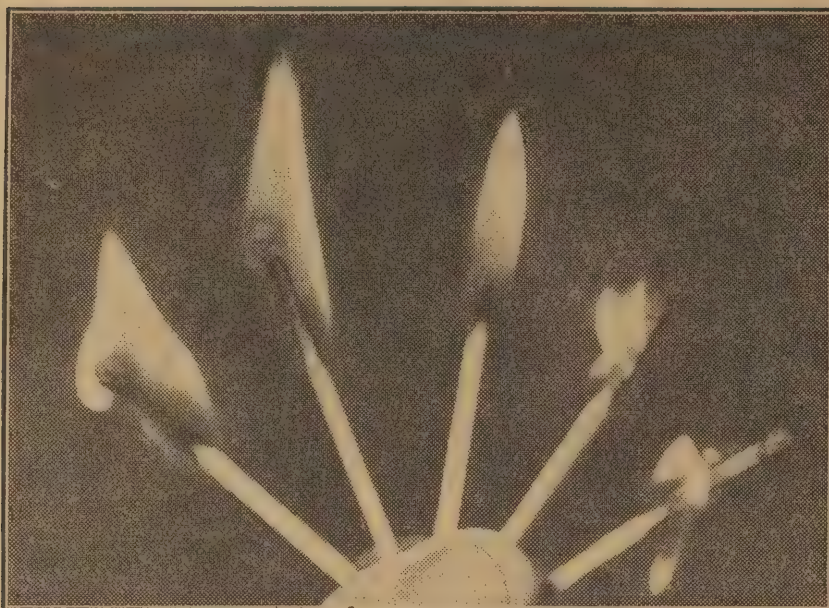
Exciter coils are installed between inboard engines and fuselage that will energise the entire wing struc-

ture so that the wing itself acts as an antenna. Operation is superior to the standard wire antenna that stretches from vertical stabiliser to cowl or the trailing wire antenna. These two standard types of antennas prevent drag, icing, and oscillation problems. Icing and oscillation of the unstabilised wire antennas bring about a frying-egg sound in receivers.

Another experimental antenna installation recently made by Wright Field engineers is a flush-mounted slit antenna at the side gunner's position of a B-17, which would be adaptable to most type of aircraft. This installation is intended for use with homing devices installed in aircraft.



# FIRE MAKING THROUGH THE YEARS



Hard to imagine that we could not always light a simple match and obtain a light such as this.

Fire is one of man's most valuable—and dangerous—servants. This article gives an outline of fire-making history, leading up to the development of the modern safety match.

**W**HEN we strike a match to light a fire or a cigarette we little realise the laborious methods superseded by this simple act, and which were used by our ancestors to produce the heat so necessary for their existence.

Compared with the number of years man has spent upon the earth, and during which time he has always been able to light a fire one way or another, the match is a recent invention, of the year 1827. Previous to that year, one of the most favored methods of making fire was by means of the flint and steel.

One wonders sometimes whether we have progressed so very far since that time, when attempting to operate that modern version of the flint and steel—the petrol lighter. This type of lighter is often more uncertain than the old method, and a distinct hindrance to the maintenance of good tempers.

## THE FIRST FIRE

Primitive man, it has been asserted, obtained his fire accidentally when lightning set fire to a tree which it had struck. This fire was guarded, and never allowed to go out while man lived in the vicinity. What happened when he wanted to move or was driven away by hostile neighbors is not related. Presumably, he must seek another tree, although his

chances of finding one must have been hopelessly remote, for such things don't happen very often.

It is highly probable that in some countries the primitive people made use of the natural fires from volcanoes. What more natural than to suspend an animal over an aperture from which issued natural fire? An excellent way of having a barbecue without much trouble.

In very early days, fire was looked upon with a good deal of superstition, for it was thought to be a gift from the gods. The awe inspired in the hearts of these people by a forest fire must have been very great. We find that the worship of fire became part of early religious rites. It will be remembered by students that Prometheus stole fire from heaven for the use of the people, and another good-hearted fellow with a very appropriate name, Zoroaster, used fire as an important part in worship.

It seems undoubted that the original method of artificially producing fire was the rubbing of two sticks together. When two objects are rub-

bed together very rapidly, heat is developed from the friction. Most of us have found this out merely by observation. The blisters on our hands are produced by the friction of the axe-handle, or its equivalent.

As a schoolboy, I did a little damage to school desks and rulers by rapidly rubbing the edge of the ruler on the corner of the desk. Unfortunately, the resulting smell of smouldering timber and the clouds of smoke always gave the show away, and further demonstrations of the heat developed by friction was undertaken by the teacher with his cane. I can only put this down to an unsympathetic understanding on the part of the teacher towards a pupil blessed—or cursed—with a natural bent for experiment.

One of the simplest methods used by natives to this day is the running of a blunt-pointed stick along a groove in a piece of wood lying on the ground. The natives are quite expert, and can produce fire in a few seconds. Much quicker indeed than with some modern cigarette lighters.

## FIRE-STICKS

In the Malay Peninsula, fire is produced by rubbing two pieces of bamboo together. This is a unique method, for, unknown to the natives, bamboo contains a coating of siliceous nature, so that the wood contains many minute quartz crystals. These are very hard, and, when rubbed together, produce sparks similar to those seen coming from an emery wheel. That is if one has enough energy.

Captain Cook, in an account of his visits to Australia, described what is known as the fire drill method used by the Australian natives at that time. "They take two pieces of dry, soft wood. One is a stick about eight or nine inches long, the other piece is flat.

"The stick they shape into an obtuse point at one end, and, pressing it upon the other, turn it nimbly by holding it between both their hands, as we do a chocolate mill, often shifting their hands up, and then moving them down upon it, to increase the pressure as much as possible."

There are many variations of this ancient method of fire making, and, strangely, these are used in remote corners of the earth by natives who have had no intercourse with other natives, or white men.

## OTHER METHODS

The Gauchos of South America, use a device somewhat resembling the carpenter's brace, in which they revolve a stick. This possibly saves the blisters on the hands. The Eskimos, who goodness knows need fire more than anybody else, revolve a stick by means of a piece of string or cord wrapped round it. By pulling the two ends alternately the stick revolves very rapidly. Then there is the bow drill

by Calvin  
Walters



# FIRE STICKS TO SAFETY MATCHES

used by the Sioux Indians. This is like the bow of a bow and arrow outfit in which the string is rather loose. It is wrapped round the stick. A backwards and forwards movement of the bow causes the stick to revolve.

To produce fire by these methods takes about ten minutes. When sparks begin to appear, these are gathered into some dry grass which is swung around at arms length until the breeze has fanned the sparks into a blaze.

A later development in the art of fire making was the use of minerals. Thus the Fuegians produced sparks by striking with a piece of flint upon iron pyrites. This seems to be the origin of the word "pyrites" which is derived from the Greek word "pyr" meaning fire. The sparks produced were allowed to fall upon "tinder," a kind of incompletely burned textile. By blowing on the tinder at the same time, it ignited.

## FLINT AND STEEL

It is not a great advance to the age of flint and steel, for with the discovery of iron, it was obvious that this would soon take the place of iron pyrites.

When this method became of use to civilisation, many forms made their appearance. Little boxes richly ornamented were used to contain the tinder, and the pieces of flint and steel were fashioned into a variety of shapes. The whole outfit was made to conform to one's station in life. The poor man carried any old chunk of iron or steel and held his tinder in any old container. The rich man had specially shaped contrivances and contained his tinder in gold boxes studded with jewels.

## FIRE PISTOL

Later came a form of gun called a "fire pistol." This was similar to the gas lighter used today. In this a trigger was pulled which struck a piece of flint against steel. This ignited inflammable material held in the barrel of the gun. It was a much more convenient method than having to carry around several pieces of metal and a box.

An improvement on the flint and steel method was the introduction of sticks of wood tipped with sulphur. On obtaining a fire in the tinder box, one of the sticks was inserted in the flame and ignited, thus producing a flame for a longer period than was possible with tinder alone.

## CONGREVE MATCH

As mentioned previously, matches were not invented until 1827, but almost preceding them there was a type of friction match known as the "Congreve" after Sir William Congreve, an artillery officer.

These consisted of a splinter of wood tipped with sulphur which was in turn tipped with a mixture of one



Nowadays, shortages permitting, modern firesticks such as these allow—

part of chlorate of potash and two parts of black sulphide of antimony. Ignition was obtained by suddenly drawing the match through two pieces of sandpaper held between the fingers. Sufficient heat was produced to ignite the chemical mixture and thus the wooden splinter. These were probably the first friction matches.

What were known as the "Prometheans" were a type of match used for a short time prior to the Congreves. These were really chemical

matches, and consisted of a small tube of paper "headed" with a mixture of sugar and chlorate of potash. This mixture ignited when touched with strong sulphuric acid. For the purpose, the acid was contained within the chemical mixture in a small glass bead. By compressing the "match" with a pair of pliers, the bead was broken, whereupon the acid ignited the chemical mixture. Some daredevil people broke the bead with the teeth, and the story is told of a man who in Cornwall exhibited the match to a group of tin miners. On breaking it between his teeth, and producing a flame, the superstitious miners dragged the unfortunate man three times through a pond as a wizard.

This "Promethean" match descended from one invented in Vienna in 1812. In this case the acid was carried in a small vial into which the match was immersed. At about this time also, phosphorus was used in a form of a chemical match. Small quantities of a phosphorous and sulphur mixture were fused together in a test tube immersed in hot water. The tube was then corked up. To obtain a light a wooden splint was immersed in the mixture and withdrawn, when the slightest friction would cause the stick to ignite.

A complicated arrangement of producing a flame by chemical means was that known as a "philosophical lamp," and invented early in the 19th century by one Dr. Johann Wolfgang Dobreiner. This contraption was so



—three pretty girls to defy superstition, and light three cigarettes from a single flame.



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unique that it is worth a little detail in describing it.

The principle of the lamp lay in the property of spongy platinum becoming incandescent in the presence of hydrogen gas. This principle is made use of in a gas-lighter of the present time. A small amount of spongy platinum is encased in a tube, and when this is inserted in the gas jet the hydrogen in the gas brings the platinum to incandescence, thus lighting the gas.

### PHILOSOPHICAL LAMP

The lamp consisted of a cylindrical glass vessel about six inches high and four inches in diameter. It was furnished with a metallic lid to which was fastened a bell-shaped glass, reaching a little over half-way down into the cylinder. The upper end of the bell was furnished with a tap, and from the centre of the lid a piece of zinc was suspended so as to hang down inside the bell. Now, if this vessel is filled about half-way with water and the tap closed, when the bell is inserted into the water the air in the glass bell will be under a certain degree of pressure. When the tap is opened, water will enter the bell so as to find its own level and thus force the air in the bell through the tap. If now the water is acidulated with sulphuric acid, the zinc in the glass will begin to dissolve, thus giving off hydrogen gas which will fill the glass bell. When the tap is opened this gas will escape and come into contact with a piece of spongy platinum. This will be brought to incandescence and ignite the hydrogen gas. A glance at the accompanying figure will make the matter more clear.

Needless to say, such a lamp did not gain much favor except as a demonstration on the chemist's lecture table.

### FRICITION MATCH

Although the first friction match was devised in 1827, it was not until 1833 that these came into public use. At that time John Walker of Stockton-on-Tees set up a factory. From that day, the match industry has spread to all parts of the world.

A match depends for its action on the heating action of friction igniting a chemical compound which in turn ignites the wood or other material of the match-stem. In order to get an easy "strike," it is necessary that some chemical be used which has a fairly low ignition temperature. In the early days, the chemical used for this purpose was white phosphorus, which takes fire at very low temperatures. Mixed with the phosphorus there is always another chemical which will oxidise and maintain the combustion of the phosphorus until the wood or wax stem has been sufficiently raised in temperature to also ignite. The chemicals mostly used for this purpose are chlorate of potash, nitrate of potash, and peroxide of lead. This latter has been used to make a so-called "silent match" much favored by burglars.

The phosphorus and other chemicals are mixed with glue to bind them together, and, with the addition of

## FIRST FRENCH JET AEROPLANE



An experimental jet-propelled plane—the first constructed in France—rests atop the French four-motored plane "Languedoc" Oct. 21, before being taken up 9000 metres for its first flight. The French Engineer Leduc, who designed this jet plane, said the test was successful. The flight was made from the Franczal airfield, Toulouse.

ground glass and coloring matter, are attached to the match-stick and dried. Slight friction on any rough surface will produce ignition.

Later, investigations were devoted to the reduction of the amount of phosphorus in the mixture, as this substance was highly poisonous and disagreeable in use and a danger to the workpeople engaged in manufacture. The quantity was constantly reduced, until in 1861 the amount of phosphorus in the ignition mixture was less than 1-12th of the whole mixture.

A notable advance in match-making came in 1851 with the discovery of what is known as "amorphous" phosphorus. This is a red variety made from ordinary phosphorus subjected to heat under certain conditions. It is non-volatile, almost non-poisonous, does not change when exposed to air, and ignites at a higher temperature than the ordinary variety. This phosphorus was called Schrotter's phosphorus after a chemist of that name from Vienna, who investigated its properties. The first matches made from this variety were exhibited in the Great Exhibition in London in 1861, but did not take on with the public perhaps for the reason that the public is usually suspicious of anything new.

### NEW MIXTURE

In 1854, however, three continental firms marketed a friction match, the head of which contained no phosphorus, but making use of amorphous phosphorus, nevertheless. These were what are now known as safety matches and which are in universal use.

Of course, the many firms which make these matches have their own methods of manufacture with their own "trade secrets" regarding the mix-

ture used, but in general the following is the principle of the safety match.

The head consists of a mixture of chlorate of potash and sulphide of antimony bound together with glue. A mixture of these two chemicals in the form of dry powder will explode with great violence with a moderate amount of friction, but in a match head the presence of glue prevents the union of the two chemicals.

### STRIKING SURFACE

The amorphous phosphorus is mixed with black oxide of manganese or sulphide of antimony, and is painted on the side of the match-box. This is the striking surface upon which the match is rubbed. This action produces an amount of heat sufficient to ignite the phosphorus at the point of contact. This heat is conveyed to the ignition mixture on the head of the match, which ignites, and in turn ignites the wooden stick. The stick is nowadays treated by immersion in wax or stearin, which assists in the combustion of the wood.

Some of the early Swedish safety matches contained such chemicals as bichromate of potash, red lead, &c., in the ignition mixture.

Efforts are being made to dispense with phosphorus entirely in matches.

Although we can strike a light much easier than our ancestors, certain relics from the age of flint and steel still remain in the form of petrol cigarette lighters and gas lighter guns. In these the sparks are produced by the rubbing of a serrated steel wheel on a piece of "flint" manufactured from the metal cerium. This metal is used in tracer bullets and is responsible for the comet-like tail of these bullets when fired.



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**A**N unusual use of a helicopter was made recently by RKO Studio to film a picture. It proved of great value in outdoor scenes where rapid action was required over a wide area.

One such scene is illustrated here, showing a motor car chase scene. Construction of dolly tracks and towers is made unnecessary by hiring the autogyro instead.

Pictures have been taken more than once from these aircraft, but in this case, a standard Mitchell camera was used. It was mounted on an Akeley head on a special tubular frame, attached to the side of the aircraft.

The studio estimated that, although the rent of the gyro was 700 dollars per day, it saved the studio ten thousand in the long run.

The lower picture shows a close-up of the camera and operator. A stabiliser runs cross-wise to the propeller to eliminate vibration.





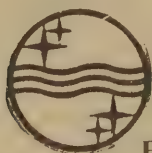


**A**S you've noticed, Philips Valves are now appearing in the smart new blue and yellow cartons . . . or at least *some* of them are. The change-over is being made gradually, due to the fact that considerable stocks of the old-type cartons must be used first. There is an acute shortage of carton board, and to scrap all old stocks would be inexcusable waste.

Although, for some time, you will receive your supplies of Philips Valves in both new and old cartons, *each and every valve is straight from the assembly line.* Old cartons for a time . . . yes! But the valves inside . . . *as new as the minute.*

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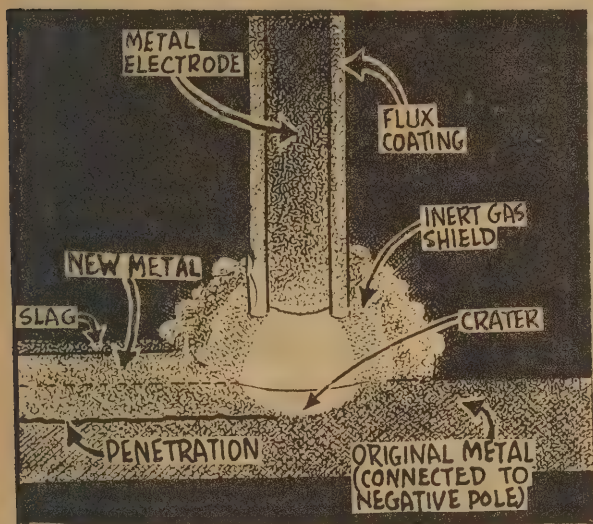
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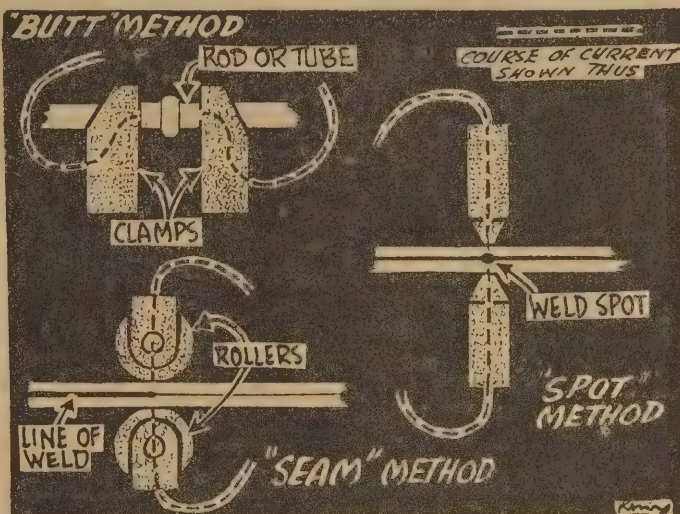
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# HOW IT WORKS — ELECTRIC WELDING



ARC WELDING

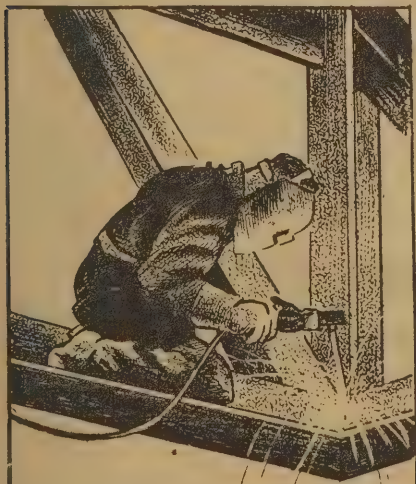


METHODS OF RESISTANCE WELDING

Welding—the operation of joining two pieces of metal together while they are still hot enough to be plastic—is an old process, practised by the blacksmith, but it has been revolutionised by electrical processes.

**T**HERE are two principal methods employed—arc and resistance. In the case of arc welding, the intense heat of an electric arc flame is used to fuse the metal and deposit additional molten metal in the space between the plates to be joined. Resistance welding depends upon the resistance offered to the passage of heavy currents by the junction between the pieces to be joined.

In recent years electric welding has largely taken the place of riveting for many purposes in engineering. Temperatures of 5000 deg. Cent. can be obtained, so that the melting of steel is an easy matter.



WELDING PART OF A BRIDGE STRUCTURE.—WELDER WEARS SPECIAL HELMET WITH COLORED GLASS WINDOW, ALSO ASBESTOS GLOVES AND APRON, AND INSULATION AGAINST ELECTRIC CURRENT.

In arc welding, the electrode is a stick of similar metal to that being joined, and this provides the added material. Shown in diagram form is the process, in which a coated electrode is used.

The current used is generally direct current, the negative lead being connected to the work and the positive to the insulated electrode holder held by the operator, who strikes the arc and maintains it by holding the stick slightly clear.

Since it is essential to keep oxygen away from the molten metal, a coating that will give off an inert gas is extruded round the rod in the form of a flux. Under heat, this gas encloses the work, and the oxygen is excluded.

The slag that forms along the top of the new metal also protects the hot surface and is easily removed when the work is finished.

The intense emanation of injurious rays from the electric arc would quickly destroy the welder's eyesight, so he must wear a special helmet with a colored glass window. He wears asbestos gloves and apron to protect him from the shower of sparks of molten metal, as well as for an additional insulating protection against the heavy currents.

The operator is provided with a chipping hammer and a wire brush with which the surface of the article is thoroughly cleaned.

A flexible lead, from the special holder for gripping the electrode, is connected to one of the supply wires, the other wire being connected to the article to be welded or the metal table on which it is supported.

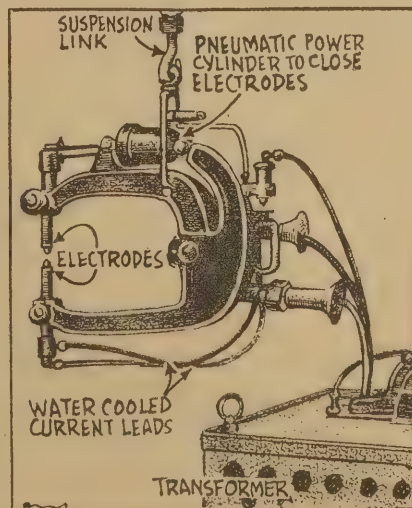
The three main methods of resistance welding, each illustrated in diagram form, are known as butt, spot and seam welding.

Butt welding is used to join lengths of rod, tube or other metal sections. A current is passed through the abutting ends of the two pieces to be welded so that heat is generated at the point of contact, and at the same time pressure is applied to force the parts together.

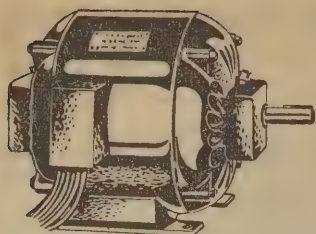
As the heating effect of the current in the metal is at the point of greatest resistance, the temperature is quickly brought to welding point, the weld being finally effected by pressure.

Seam welding is carried out by rollers that act as electrodes. The sheets of metal to be joined are passed between the rollers and the current is applied. The sheets are heated to welding point as they pass through the rollers, resulting in a continuous seam weld.

Spot welding is used for uniting sheets or thin plates, where a continuous weld is not required. The two sheets of metal to be welded are placed between the electrodes and are pressed together by clamps. When the current is switched on, the spots on the surfaces which are in contact are brought up to welding heat.







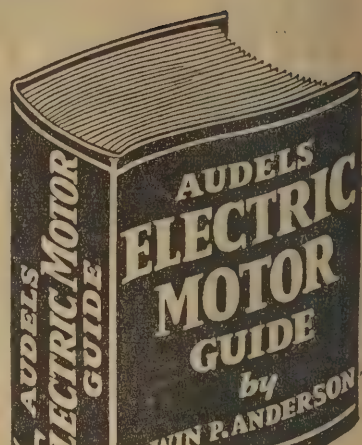
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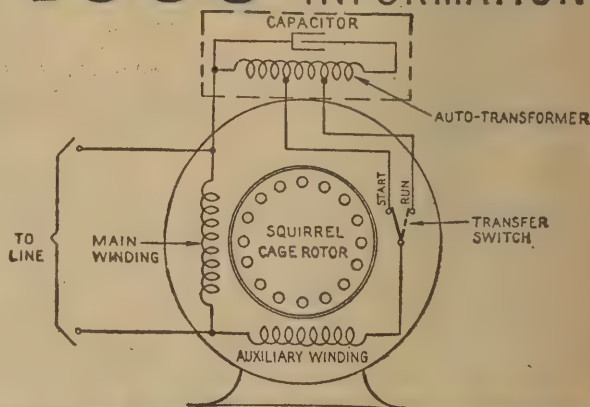
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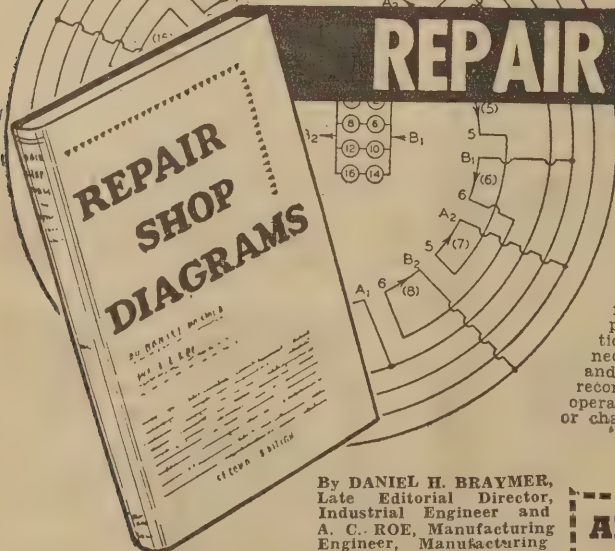
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- (2) "Repair Shop Diagrams." Price 24/6 (post 10d.).

NAME .....

ADDRESS .....

(Tech. R.H. 12/47).

By DANIEL H. BRAYMER,  
Late Editorial Director,  
Industrial Engineer and  
A. C. ROE, Manufacturing  
Engineer, Manufacturing  
and Repair Department,  
Westinghouse Electric Corporation.

### SECOND EDITION

The revised second edition of this popular shop manual incorporates the many changes, and advances in the design and construction of induction motors through World War II. It emphasises the increasing use of the three-phase motor, while still retaining sufficient data on the two-phase motor to cover the subject amply. In this edition, the coil-groupings have been extended to cover up to 720 slots, dual-voltage eight-and-nine-lead diagrams have been added, schematic-type simplified diagrams are presented and explained on the 14-pole two-phase, three-phase star and three-phase delta.



# NEWS AND VIEWS OF THE MONTH

## R.A.A.F. Wireless Reserve

RECENTLY RAAF Headquarters announced its intention of re-organising its wireless reserve. In 1939 the reserve provided some 400 radio amateurs, who, with the radio men of the Permanent Air Force, formed the nucleus of the Service's vast signalling and radar organisation. It was stated from Victoria Barracks that the Wireless Institute of Australia would play a vital part in organising the postwar reserve. Radar would also be incorporated in the training programme, a RAAF spokesman added. The news is welcomed by former reservists anxious to revive the comradeship for which the RAAF signal service was noted. Most of Australia's amateurs excelled themselves in the RAAF. The knowledge gained through their hobby enabled many an aircraft unserviceable for radio to be serviceable in a short space of time.

It is to be hoped that the RAAF will take a more active interest in the postwar reserve than it did prior to 1939. In those days the reservists conducted the own exercises with little assistance from the signal officers of the Service. Even this meagre training allowed them to take over RAAF signal watches in the first few months of the war.

To ensure an efficient postwar reserve, the RAAF must let its reservists take a more active part in the Service's peacetime signalling role. Regular training classes and exercises will have to be held for city members,

while those from rural areas will need ample correspondence tuition to keep them abreast with the happenings of the reserve.

Many of the prewar reservists have suggested the holding of regular camps to allow the members to inspect and study the latest in the RAAF's airborne and ground radio equipment. Since the war finished some notable changes have been made in this equipment.

RAAF policy to the postwar reserve is eagerly awaited by Australia's radio amateurs. But its main plank should be to streamline organisation so that, in the event of an emergency, the reserve will become part of the RAAF, with all administrative details planned in advance. If war should come again, we'll have very little time to think. Let's do all that in advance.

## Oversea's Post for P.M.G. Engineer

THE chief research engineer of the Postmaster-General's Department (Mr. S. H. Witt) has been selected to represent the Commonwealth on the newly-appointed International Radio Frequencies Board, which will have its headquarters at Geneva.

The board will consist of 11 members selected by countries elected from those attending the recent international telecommunications conference in Atlantic City.

It will deal with orderly registration of radio frequencies. It will also advise the 80 member countries of the International Telecommunications Union.

Congratulations to one of our most experienced and able communications engineers.

## RADIO CROSS-WORD PUZZLE, No. 4

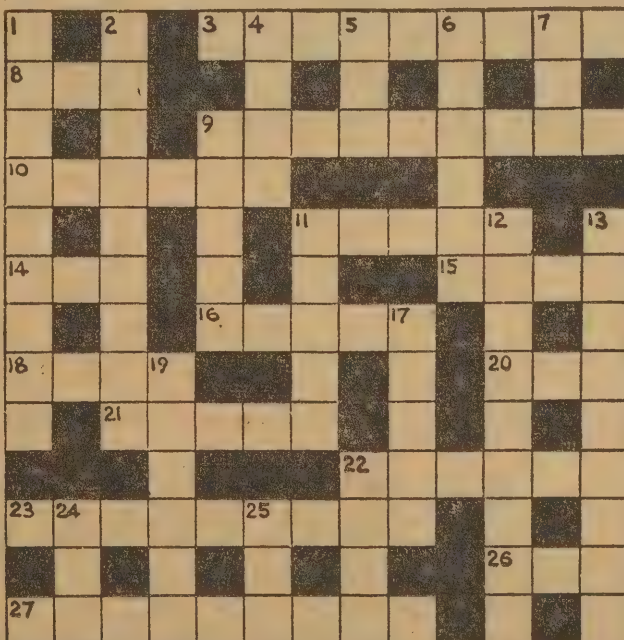
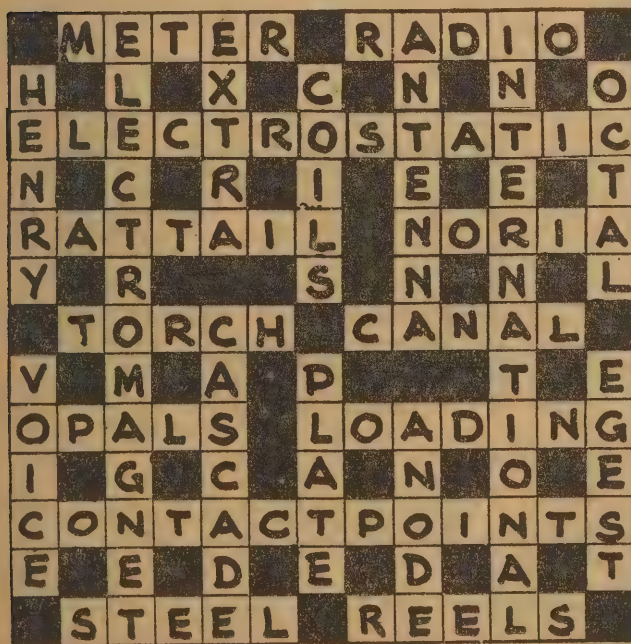
### ACROSS

3. Frequency meter.
8. Unit of resistance.
9. Found in transformer windings. (two words).
10. Time needed to complete one cycle.
11. Line up.
14. Distress signal.
15. Ascetic cult.
16. . . . regeneration.
18. Welshmen like it.
20. Oxide coated filament (abb).
21. System of aerial matching.
22. Valve elements.
23. They reduce interference. (two words).
26. Grid dip oscillator (abb).
27. Logarithmic . . .

### DOWN

1. Red ones make he-men.
2. Volts placed upon.
4. Require.
5. Exterior.
6. Needed for work.
7. Greek symbol for efficiency.
9. Systems of signals.
11. Type of rays.
12. Meter won't read. (two words).
13. Reflection of waves.
17. Cable is wound on these.
19. Used with permanent magnet.
22. Project.
24. Cereal.
25. Unit of resistance.

## BELOW: LAST MONTH'S SOLUTION





# MAXWELL'S RADIO

## The "Radio and Hobbies" 5 VALVE HANDIE-TALKIE

This circuit complete with data was presented in the October Issue of "Radio and Hobbies" and was described by Trade identities as "It's a Winner" or "The best you've ever turned out." The Set incorporates the following valves: 1R5, 2-1T4, 1S5, 3S4. The circuit is easy to follow and the cabinet size is 5" wide x 4" depth x 7" high. Because of the heavy demand for "Radio and Hobbies" Handie - Talkie Kit Sets, the set is available complete in detail with constructional data supplied.



**£15/15/-**

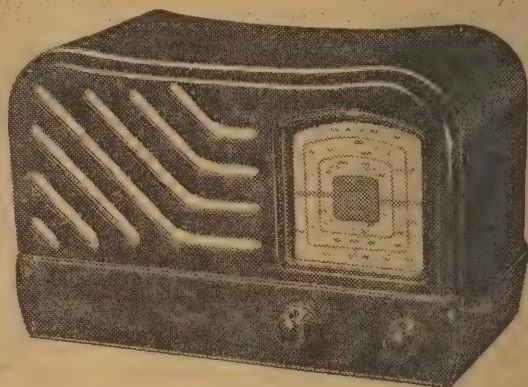
Complete with Batteries

Cabinet Only 21/-, Chassis 4/11

## 4 VALVE A/C KIT SET

BAKELITE CABINET

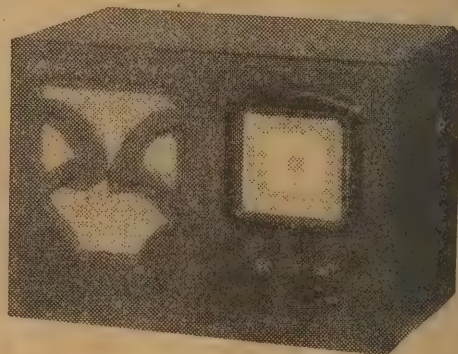
The cabinet, size 10" x 7" x 5½", together with chassis, assembly mounting plate, dial all constructed to complete a composite unit. Valves incorporated are 6J8, 6G8, 6V6, 5Y3 with 5" Magnaxov Speaker. The tested circuit is easy to follow. Completed Set has manufacturer-type finish . . . . . **£12/19/6**



## 3 VALVE A/C KIT SET

A 3 Valve "snappy" mantle model of low-price construction, the ideal set for Radiomen possessing average knowledge. This simple circuit incorporates Valves 6K7, 6V6, 5Y3. Regular and Smooth reaction ensures easy tuning eliminating the oscillation of a normal Reinartz Circuit. The Set complete with Leatherette Cabinet of "Little General Type" is perfect in every detail . . . an ideal low-priced radio.

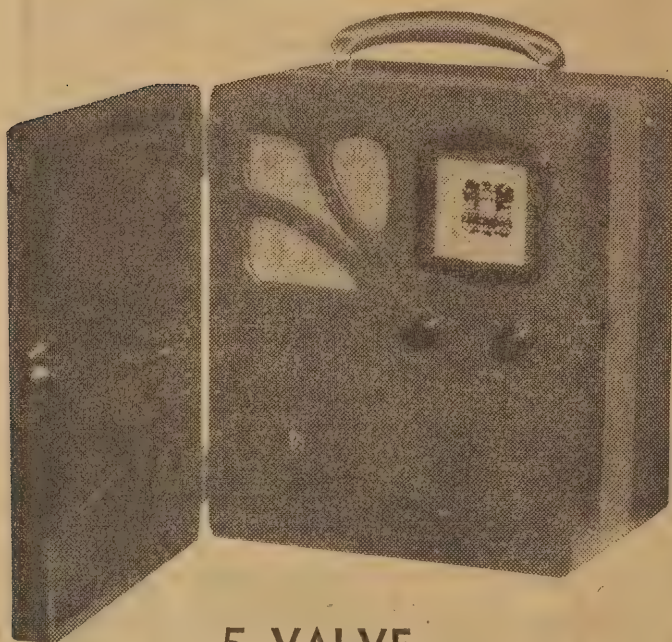
Our Price . . . . . **£8/19/6**



## 5 VALVE STANDARD PORTABLE

Standard type Portable embodying tuned R.F. Stage. Valves 2-1P5, 1A7, 1H5, 1Q5 together with Rola Speaker and Standard Batteries.

Complete in every detail . . . . . **£16/19/6**



# MAXWELL'S RADIO

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## Automatic Receiver Manufacture

A MOST interesting item of the month's news concerns a machine reported to have been perfected in Britain for the automatic manufacture of radio receivers.

It is not clear whether the method used is similar to the system by which the circuit is sprayed on a prepared base, thus doing away with almost all physical wiring. It would, however, be rather hard to imagine a machine which could wire equipment, using the popular hook-up wire, solder, and conventional components.

The machine, so runs the report, is capable of turning out 1,800,000 sets per year under the operation of one man, each set completely tested and ready for use.

The cost is reduced so that receivers made this way could sell for 25/- each, although there is no indication as to type.

The inventor, Mr. John A. Sargrove, said that the plant, which cost £80,000, was produced because during the war Mr. Churchill wanted a million radio sets in a hurry. The war ended before the machine was put to its original use, but it is now being adapted to radar and television circuits.

If the facts are as reported, the machine should advance the radio world immeasurably nearer the ideal of good, cheap radio for everyone. In fact, a device of this type seems to hold the only answer to the problem of high prices, which are now supported very largely by costly labor.

## Radio To The Moon

THE moon seems destined to play a big part in our propagation experiments using radio waves. Not long ago, American radio engineers claimed to have received a radar echo from its surface. Now our own physicists have done the same thing here in Australia, with much less elaborate equipment.

It isn't just a desire to spend money in scientific stunts which encourages them to experiment in this manner. Australia has always played an important part in the propagation sphere, and has contributed valuable data to its many phases. Long before the war, Australian research into the ionosphere gave important results which later had their bearing on communication and radar development during the war.

## Radio Control

YET another sphere of activity by the CSIR concerns the radio control of aircraft. For some time now, work has been going on with large flying models, one of which has been fitted with locally made, as well as imported, control equipment. One model is using the "Bowen wing," a design originated by Dr. Bowen of the Radiophysics laboratory. At an early date, we hope to persuade him to release some of his results for publication.

# QUIET

PERMANENTLY

*Silent Spiral  
Connector...*

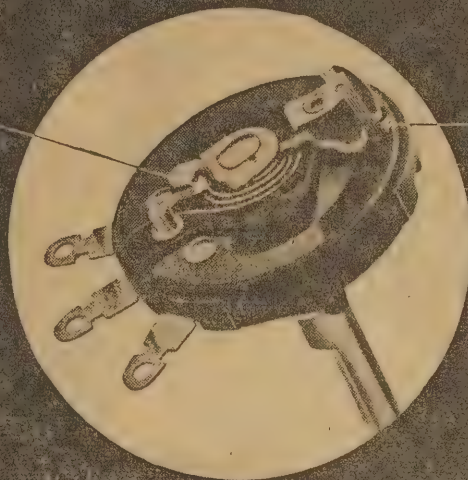


NO SLIDE  
NO FRICTION  
NO NOISE

*5-Finger  
"Knee Action"  
Contact*

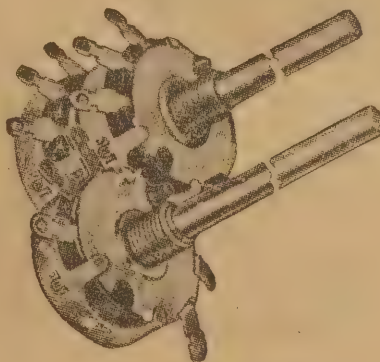


AMAZINGLY  
SMOOTH...  
PERMANENTLY  
QUIET



## IRC VOLUME CONTROLS

IRC HAS SPARED NO EXPENSE SO THAT  
YOU CAN BE SURE



Study the design of IRC Metallised Controls. Note in particular the precision construction of the 5-finger "Knee Action" Silent Element Contact and the new Silent Spiral Connector. Each of these exclusive features means thousands of pounds in research by IRC engineers. Each means additional manufacturing expense—yet IRC Controls cost you no more than ordinary controls having neither of these noise-eliminating features.

It is "plus" values such as these that have made IRC resistance products famous the world over. By giving you the greatest value for your money, by doubly insuring you against customer complaints, we protect our reputation by helping you protect yours. That is good business for both of us.

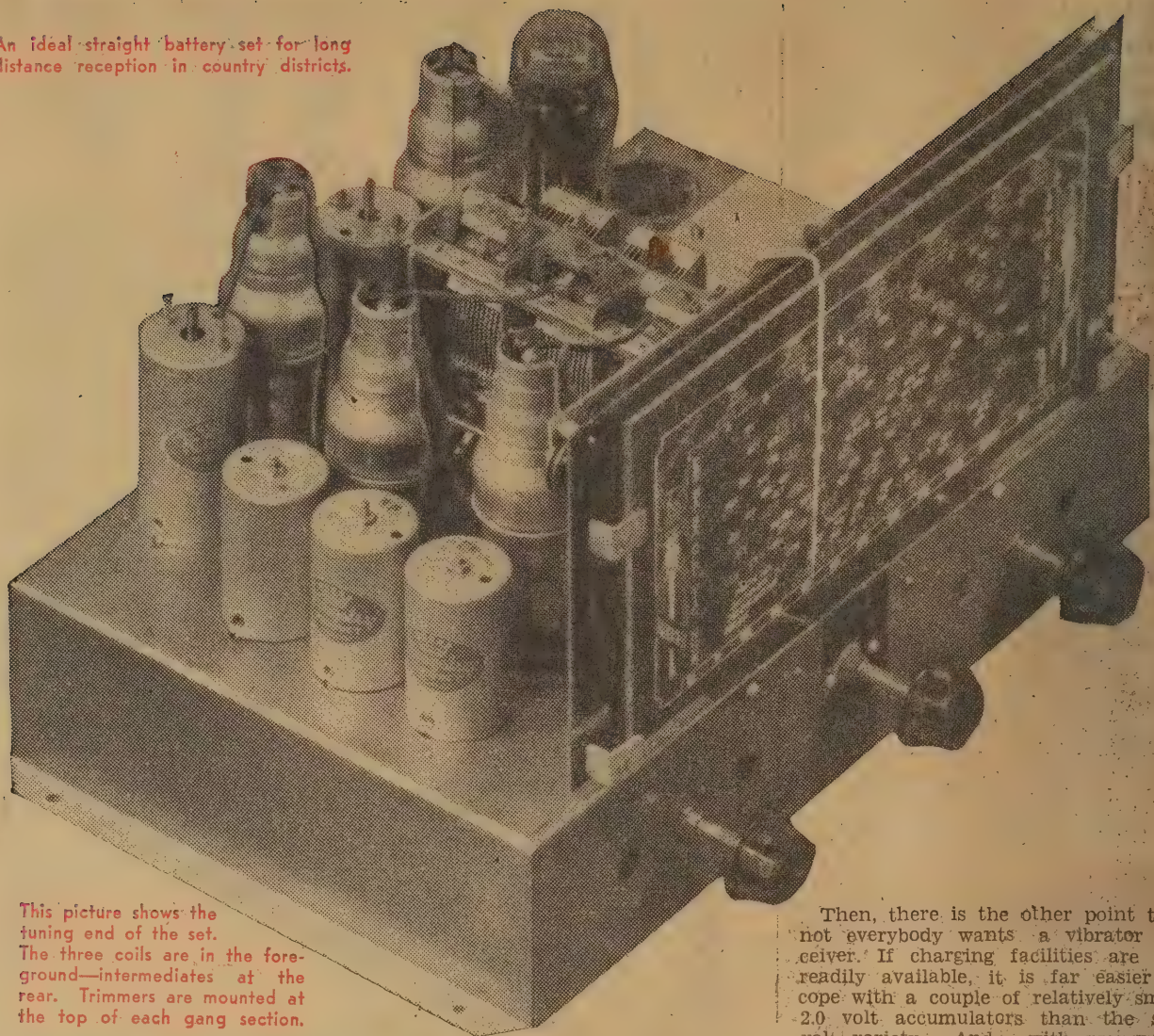
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An ideal straight battery set for long distance reception in country districts.



This picture shows the tuning end of the set. The three coils are in the foreground—intermediates at the rear. Trimmers are mounted at the top of each gang section.

Then, there is the other point that not everybody wants a vibrator receiver. If charging facilities are not readily available, it is far easier to cope with a couple of relatively small 2.0 volt accumulators than the six-volt variety. And, with reasonable economy, the B batteries will only re-

# THE PENTAGRID FIVE VALVER

**N**ATURALLY enough, we get quite a "kick" out of thinking up designs and circuit arrangements a little out of the ordinary. We thoroughly enjoyed building up the "Handle Talkie" in the October issue, the "Six-240" last month, and "Minovox"—elsewhere in this issue. And readers like these ideas both for experiment and because they often fill a special need.

But there is likewise a demand for standardised circuits by the man who wants to build up an ordinary receiver for the home. If he is a beginner, too many circuit tricks and complications only confuse the issue. At the outset he is more interested in building a receiver that works well, without being unduly worried about special features.

During the past few months we have described quite a range of vibrator-powered receivers which appeal to the countryman for their economy and convenience of operation. But there is

an undoubted complication in the vibrator supply and the possibility that a certain amount of experiment may be necessary to remove interference from this source. We employed constructional methods to minimise the problem, as well as outlining methods of dealing with the trouble, should it occur. But, whichever way you look at it, a vibrator set is harder to build than a straight battery set, and the extra element of complication is enough to deter some constructors from building their own receiver.

quire replacement every five or six months.

We have called this set the "Pentagrid Five." The name doesn't mean a great deal nowadays, except that, by long association, it applies to a range of straightforward battery receivers, described over the past 10 or 12 years.

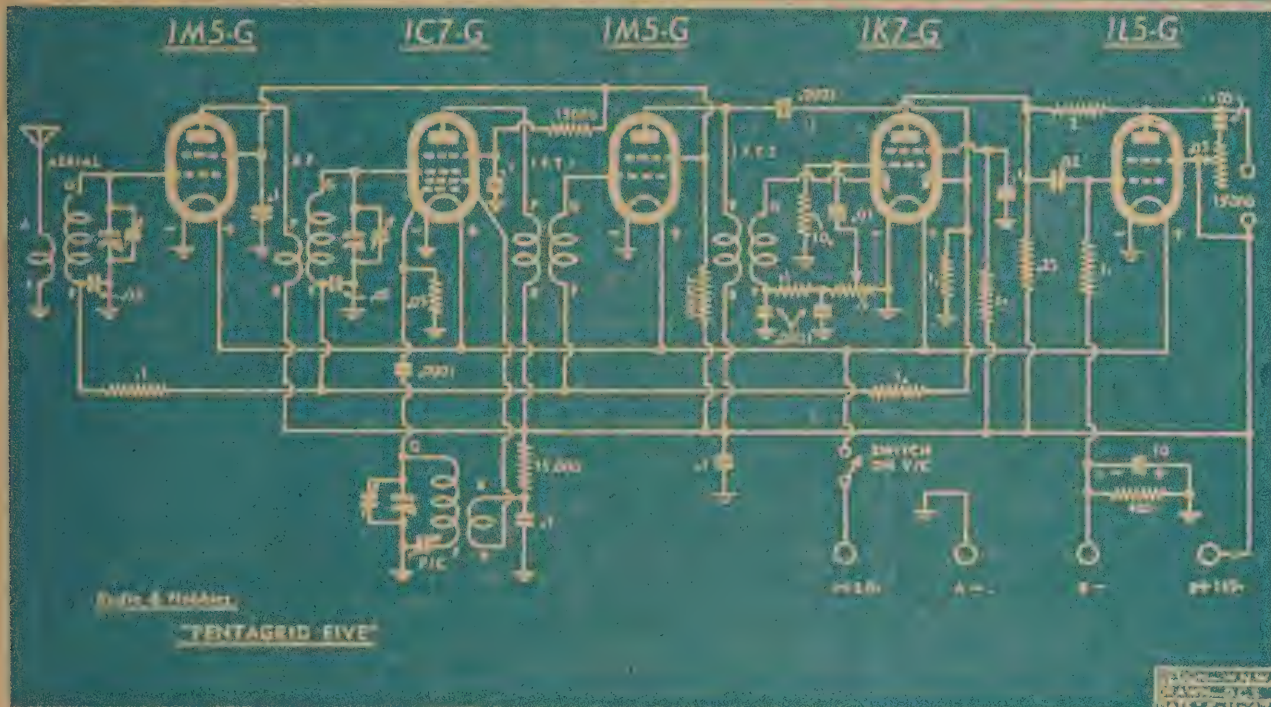
Referring to the circuit diagram, you will note that we have chosen the standard range of 2.0 volt valves, which were designed for Australian conditions. They combine reasonable economy with complete reliability, and do not look like being superseded for this type of receiver for quite a while. There has been talk of a new converter valve—the weakest link in the chain—but the valve manufacturers apparently have more pressing problems at the moment.

So, if you want a reliable work-a-day battery set, you can go ahead with this design without fear that it will

by **W. N.**  
**Williams**



# CIRCUIT DIAGRAM OF THE PENTAGRID FIVE



Although the circuit is a standard type, the use of modern coils greatly improves performance over those obtainable in the past. Both sensitivity and selectivity are excellent.

There are no tricks or frills about this receiver. It is a straightforward battery set, simple to understand and easy to build. Line it up, connect to the necessary batteries and it will tune in every station whose signal is worth listening to. It is one of those designs which has been proven by years of usage and will have its appeal for years to come.

become obsolete in the near future.

The circuit provides for an R.F. stage ahead of the converter, ensuring high gain and selectivity, together with a favorable signal-to-noise ratio.

This R.F. stage, together with a single high gain I.F. stage, will ensure sufficient gain and selectivity to tune any broadcast signal which "rears its head" above the prevailing atmospheric noise. And, after all, any gain in excess of that requirement is of no particular use.

Type 1M5-G valves are the obvious choice for the R.F. and I.F. amplifier stages, the old style equivalent being the 1C4. Both these types will work with zero initial grid bias, and we have taken advantage of this fact to obtain the utmost in circuit simplicity. The American-designed types 1A4, 1D5-GP and 34, are not intended for zero-bias operation, but would probably work out well enough in the circuit if you happen to have them on hand.

Zero initial bias is also used for the 1C7-G, again in the interests of simplicity. With reduced screen voltage, the performance on the broadcast band is quite up to the mark, which suits the requirements of this particular receiver. But, if you have any ideas of building this circuit up as a dual-wave receiver, it would be better to provide 3.0 volts bias on the converter, and to operate the screen on 67.5 volts, as in our earlier "Dual-Wave Battery Five" receiver.

The same remarks would apply if you use the 1C6, which is the old style equivalent of the 1C7-G.

Rather than tap the screen voltages from the B batteries, we elected to obtain them through dropping resistors. The voltage for the two 1M5-G screens is obtained from a 20,000 ohm resistor, which provides an effective 67.5 volts under no-signal conditions.

A further 15,000 ohm resistor drops the voltage to 45 for the 1C7-G screen under no-signal conditions. The volt-

ages may vary slightly with signal, but this is of no consequence.

For maximum performance, use modern coils and I.F. transformers. If the coils have variable iron slugs, it is usual to have a fixed padder capacitance of .0004 mfd. With air-cored coils, or fixed iron slugs, a variable padder is essential.

Don't forget that variable trimmers have to be connected in parallel with the tuning coil, either directly across the coil pins beneath the chassis, or across

## PARTS LIST

- 1 Chassis, 14in. x 9in. x 3in., as for the "1946 Standard."
- 1 AWA or Stromberg H-type 3-gang cond.
- 1 Dial to suit gang (USL/46 or similar).
- 3 Trimmers, 30 mmfd.
- 4 Valve shields.
- 1 Aerial Coil (B/C).
- 1 RF coil (B/C).
- 1 Oscillator coil.
- 2 455 kcs. IF transformers.
- 6 Octal sockets.
- 1 6-pin socket and plug.
- 1 5-pin socket and plug.
- RESISTORS**
- 4 10 meg., 1 2 meg., 4 1 meg., 1 .25 meg., 2 .1 meg., 1 .05 meg., 1 20,000 ohm, 2 15,000 ohm, 1 400 ohm.
- 1 .5 meg. potentiometer with on/off switch. 1 .05 meg. potentiometer.

## CONDENSERS

- 1 10 mfd. 40 PV., 5 .1 mfd. tubular, 3 .05 mfd. tubular, 1 .02 mfd. tubular, 1 .01 mfd. tubular, 1 .0004 mfd. mica or 455 kcs., variable padder, 3 .0001 mfd. mica.

## VALVES

- 2 1M5-G, 1 1C7-G, 1 1K7-G, 1 1L5-G.

## SPEAKER

- 8in. to 12in. with transformer to match voice coil impedance to 15,000 ohms.

## BATTERIES

- 3 45-volt Superdyne 'B' batteries.
- 1 2-volt heavy-duty accumulator.

## SUNDRIES

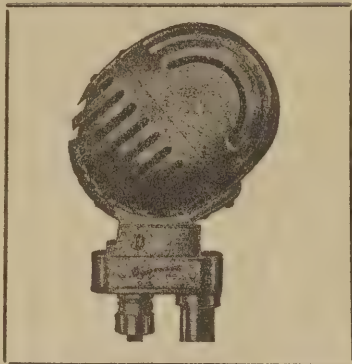
- 3 knobs, 2 terminals (1 red, 1 black), 4 grid clips, shielded wire, a piece of scrap aluminium, solder lugs, hook-up wire, nuts and bolts, &c.



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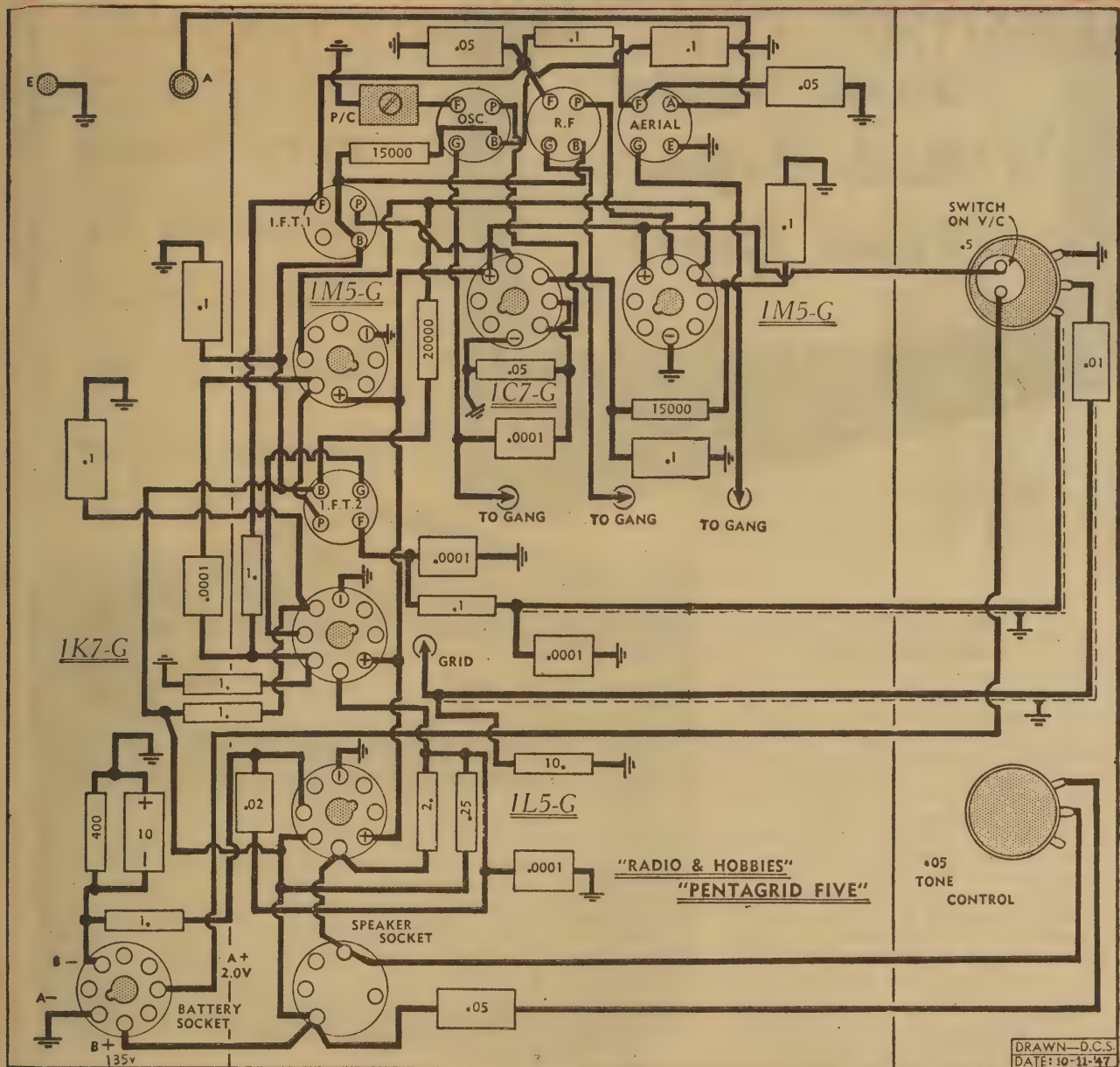
*The EfcO Manufacturing Company, manufacturers of Radiomaster dials, escutcheons and tuning units wish their clients a happy Christmas and a prosperous New Year.*

**EFCO MANUFACTURING Co. Pty. Ltd.**

**PRINCES HIGHWAY, ARNCLIFFE, SYDNEY, N.S.W.**



### WIRING DIAGRAM FOR THE PENTAGRID FIVE



This diagram will help you when wiring up the receiver.

each section of the tuning gang, as in the original receiver. Variable iron slugs definitely do not substitute for these trimmers. The slugs are for adjustment only at the low frequency end of the band, whereas the trimmers allow the circuits to be peaked at the high frequency end. Many readers appear to be confused over this point.

The I.F. transformers should definitely be of the iron cored variety, most transformers nowadays employing variable slugs for alignment purposes. Be sure to connect them the right way round in the circuit, as a reverse connection to any one of the windings will usually drop the gain substantially.

The diodes of a 1K7-G provide detection and AVC voltage. The detector diode is the one nearest the negative end of the filament, which is pin 5 in the case of the 1K7-G. Extra R.F. filtering

is provided in the volume control circuit to remove a trace of instability with the volume control in the maximum position.

The AVC diode is adjacent to the positive end of the filament and, being returned ultimately to chassis, has an effective and very handy delay of two volts. This ensures that the AVC does not come into operation on very weak signals.

✓ You can use the 1K6 in place of the 1K7-G, or the American types 1F6 or 1F7-G. A diode-pentode is to be preferred in this position because of the additional audio gain it provides.

The usual negative bias is not applied to the grid of this valve, the grid resistor being made very large to provide so-called grid-leak bias. This scheme appears to be quite satisfactory with pentodes and high- $\mu$  triodes, under resistance coupled conditions, and cer-

tainly helps simplify the circuit.

The constants in the plate and screen circuits are quite usual, even to the 2.0 megohm feedback resistor to the plate of the output valve. This reduces the already ample audio gain by a small factor but brings about an improvement in the tonal qualities.

A 1L5-G is used in the output stage although a 1D4, 1F4 or 1F5-G would substitute without change to the electrical circuit. This is the only valve in the circuit requiring bias and the necessary 4.5 odd volts is provided by a 400 ohm back-bias resistor in the B-minus lead. The back-bias resistor and the associated bypass represent very little extra complication in the circuit and eliminate the need for a separate C-battery.

Another important point is that back-bias tends to adjust itself automatically as the B-batteries run down, thereby



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*New University  
PK4X 4-valve  
Portable Kit Set  
offers endless  
pleasure for the  
Christmas Season*

Now released specially for Christmas and the summer months, University's great portable kit set is back again—improved in sensitivity, tone, appearance and ease of construction.

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The new PK4X Portable is a greatly improved radio and incorporates all the latest technical advances. Even the famous PK3, PK4 and PK5 of the 1940 range are superseded.

The new PK4X is a four-valve portable kit set employing the latest bantam-type valves and minimax-type batteries.

Housed in a genuine leather-covered carrying case, it includes all the parts necessary for the construction of a modern receiver. Carefully engineered and designed the PK4X is simple to assemble with a few ordinary tools. A complete book of instructions specially written for the kit set is included in every package and the easy-to-read and easy-to-follow text is accompanied by clear photographs showing wiring diagrams, circuits and completed appearance.

## INSTRUCTIONS ARE SIMPLE, EASY-TO-FOLLOW

The instrument is all assembled for you and wiring is simple and capable of being carried out by anyone who can use a soldering iron.

A clearly marked dial carries all the major stations in Australia and this portable PK4X is suitable for every State.

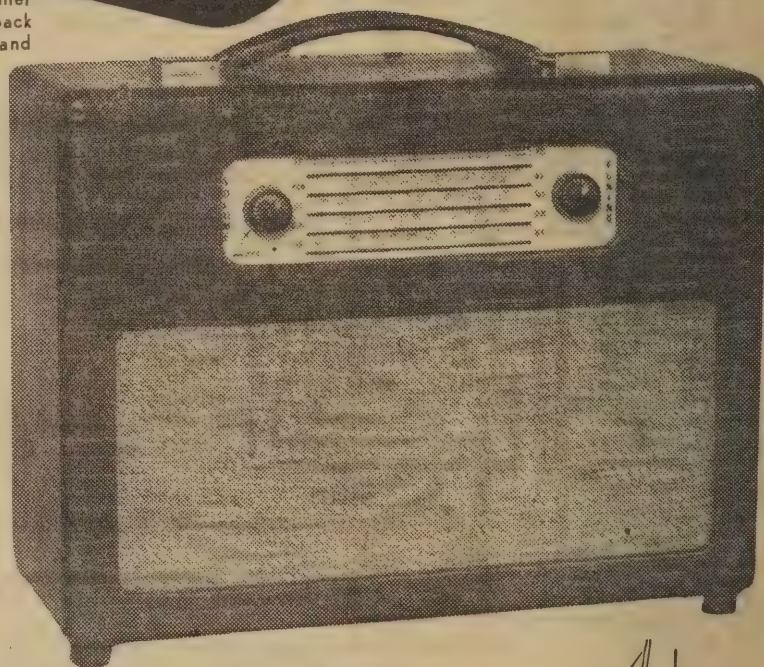
Get your PK4X now. It is available from all leading distributors throughout the Commonwealth and your satisfaction is guaranteed and backed by a name that is well-known in the radio industry.

## TECHNICAL DETAILS

Attractive technical details of this popular kit are a well-designed cabinet covered in solid leather, 5" Alnico type speaker is used, four modern bantam series valves, modern straight line dial, Minimax batteries, special effectively designed loop aerial, provision for external aerial for use in country districts, good tonal quality and excellent sensitivity.

Retail price including sales tax is £16/19/6

(Trade enquiries invited.)



MADE BY THE *University Radio Co.*

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preserving the tonal qualities as long as possible.

The filament supply should, of course, be derived from a 2.0 volt heavy duty accumulator. Filament current for the whole receiver is 0.72 amp.

### "STANDARD" CHASSIS

To avoid the necessity for a special chassis, we built the receiver up on the "1946 Standard" chassis, covering the power transformer hole with a flat aluminium plate. There is nothing in particular against this plan and it does leave the space available for a vibrator power supply to be added at a later date.

In fact, you can go ahead and build this set as a first effort and later convert it to the "Vibra-Five," which we described in the December 1946 issue.

The major components follow a logical progression around the chassis. Either an AWA or a Stromberg "H" gang can be mounted in the available space, the main point being to see that you purchase a tuning dial to suit whichever gang you decide to use. The gang should be mounted with its back to the valves, to ensure conveniently short grid leads.

The mounting feet must be turned inwards for this chassis and should then coincide with one or other set of gang mounting holes.

We used the USL-46 type dial for the set and this should be slipped temporarily into place to check the mounting of the gang condenser. The gang should be raised as necessary to bring the dial to a convenient height without, however, causing the flywheel to foul the underside of the chassis. Fix the gang mounting position, bolt it firmly into place and then remove the dial for the time being to avoid risk of the glass being broken.

### VOLUME CONTROL

The volume control mounts on the left and the tone control on the right. It is just as well to have these spindles at exactly the same level as the dial spindle and it may be necessary to elongate the mounting holes a trifle to accomplish this. Controls should either be exactly in line, or thrown out of line so far that their position looks planned rather than accidental.

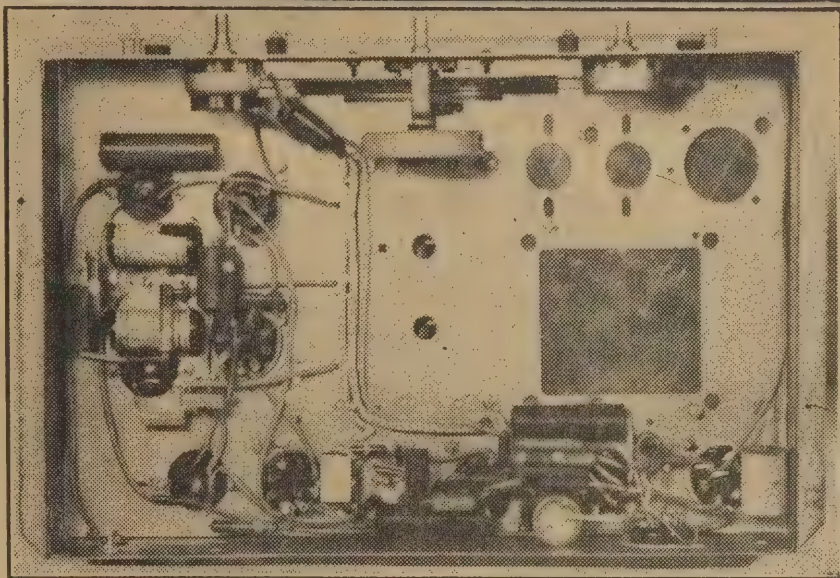
The volume control, incidentally, carries the "off-on" switch, thus avoiding the necessity for an extra knob on the front panel of the cabinet. This extra knob would have presented a difficulty in achieving balance without drilling extra holes.

The R.F. amplifier and converter valves are alongside the tuning gang, their grid leads coming straight across from the stator plates of the two front sections.

The aerial coil is at the front left-hand edge of the chassis, with the R.F. and oscillator coils in line behind it. Grid connections for these coils have to run from the gang stator plates down through the chassis and across to the appropriate pins on the coils. The leads are thus fairly long, but will not cause trouble if they are kept well up against the underside of the chassis.

When mounting the coils, sockets and I.F. transformers, be sure to locate

## UNDERCHASSIS OF PENTAGRID 5



Note the blanked out area of the chassis.

the pins for the shortest plate and grid connections.

The first I.F. transformer is in the rear corner of the chassis, then the I.F. amplifier valve, the second I.F. transformer, the detector and the output valve. The spare socket alongside the output valve is used for the speaker

outlet, while the normal speaker socket at the rear of the chassis serves for the battery connections.

When assembling the components to the chassis, slip solder lugs here and there beneath the mounting bolts and these can well be connected together with a bare copper busbar, to ensure a

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# Christmas

## SUGGESTIONS FOR THE RADIO ENTHUSIAST!

### MANTEL KITS in PLASTIC CABINETS

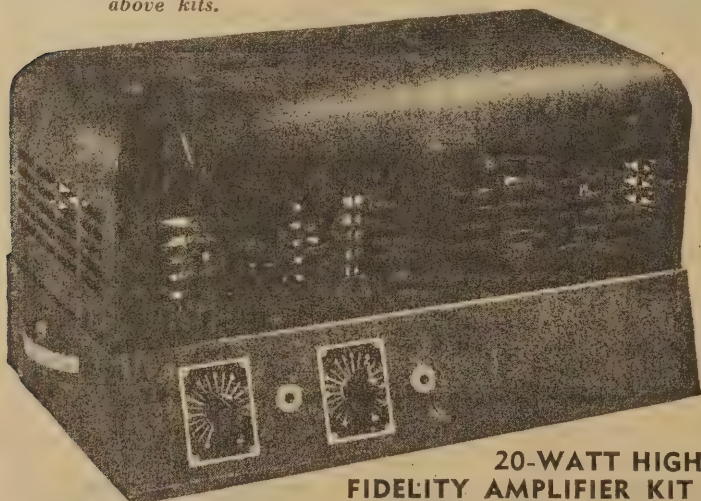
WHEN you invest in an Electronic Parts Kit you get the very best value for your money. Only best quality components are included—each kit is complete with valves, Rola speaker, full building instructions, and everything for you to build it up, right down to the last nut and bolt. Here are four “cracker-jacks” in the famous Electronic Parts plastic cabinet (right) . . .

- ★ 4-valve Broadcast A.C. Kit Set, an all-time winner at the bedrock price of £12/15/3 (postage extra).
- ★ 3-valve Triple Wave A.C. Kit Set, complete with loudspeaker-satisfaction guaranteed because the coil unit is pre-tested, only £12/-/- (post. free).
- ★ 4-valve B/C Vibrator operated Kit Set, using the Ferguson Vibrapower Unit. This kit is complete with all parts including 6 volt, 130 A.H. accumulator for only £19/15/- (freight extra).
- ★ 4-valve B/C Battery Kit, complete with all batteries, £16/8/- (freight extra).

NOTE: Free Technical leaflet available describing each of the above kits.

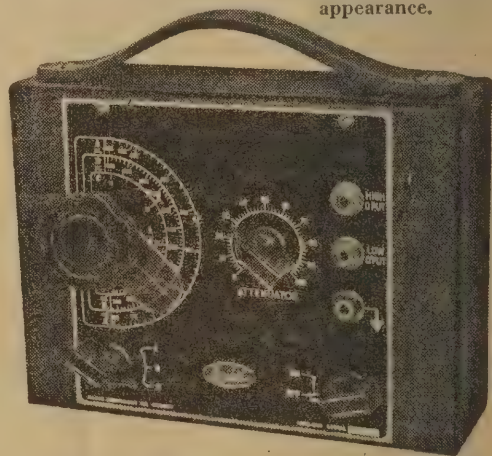


This beautifully finished plastic cabinet will give your completed set a high quality professional appearance.



### 20-WATT HIGH FIDELITY AMPLIFIER KIT

For the high fidelity P.A. enthusiast who must have the best, we present this push-pull 7-valver. Read all about it in the technical leaflet, free upon request. Complete kit of parts, including valves, etc., only £18/10/-.

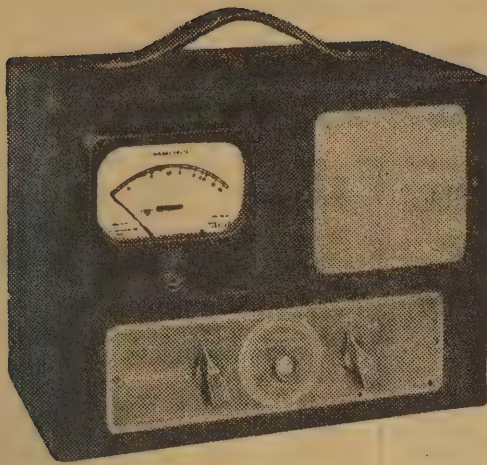


### “University” Oscillator Kit Set

Simple to build, the new “University” model OK1 oscillator kit covers all fundamental frequencies in the average receiver. Dial is specially pre-calibrated. Price only £8/5/- (Sales Tax included).

WHOLESALE DISTRIBUTORS OF EV





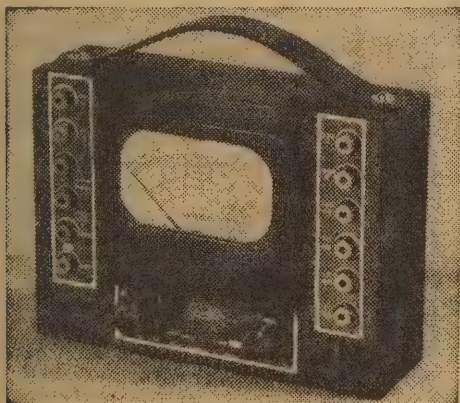
### 4-VALVE PORTABLE KIT (Right)

Serenade your sweetie with the Electronic Parts portable. This absolutely remarkable kit is available from stock complete with valves, batteries, full building instructions, and everything to build it up, for only £15.12.0 — (Freight extra).

### "R & H" and KINGSLEY KIT SETS

Yes, we can supply complete kits to build all "R & H" and Kingsley circuits. Descriptive kit set price list free upon request.

- Springtime Portable (5-valver).
- Handie Talkie Portable (5-valver).
- 1947 Advance (5V-D/W-A.C.).
- Fireside 5 (D/W & B/C-A.C.).
- 1946 Standard (7-valve D/W-A.C.).
- Little General D/W & B/C (4-valve A.C.).
- Vibra 4 (4-valve Vibrator).
- Vibra 5 (5-valve Vibrator).
- Tom Thumb (2-valve B/C Battery).
- Senior Radiogram (8-valve D/W).
- Pentagrid 5
- 3-Valve Regen' Set



### "UNIVERSITY" MULTIMETER KIT

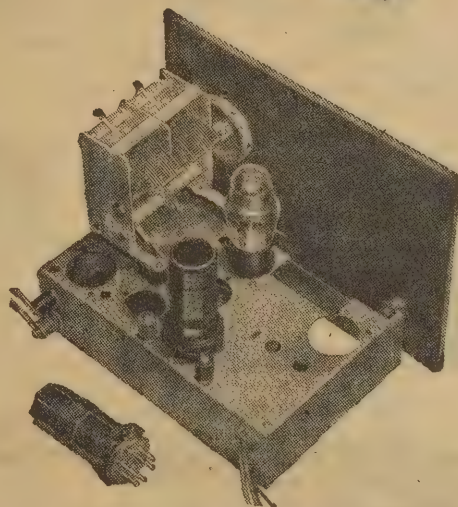
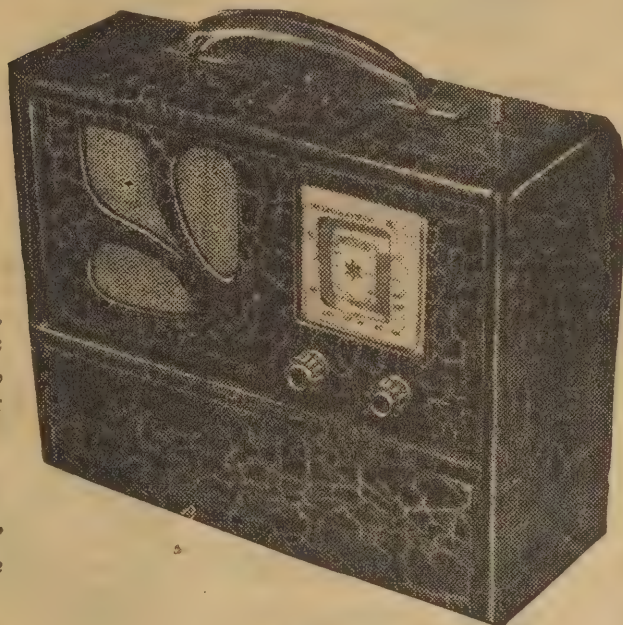
Fitted in the same size carrying case as the OK1 oscillator these two instruments make a super efficient pair for the radio enthusiast. Read all about them on descriptive leaflets which are available free upon request.

Price for AC-DC Multimeter Kit, only £8/7/2 (Sales Tax included).

**RYTHING IN RADIO.**

### TEST EQUIPMENT

Test gear, essential to the radio enthusiast, is our specialty. We carry full stocks of all "University" instruments, and will gladly send you an illustrated test equipment brochure free upon request. Left is illustrated the "University" Signal Tracer. The "University" range includes Multimeters, Valve and Circuit Testers, Oscillators, Universal Speakers, etc.



### 1-VALVE KIT FOR BEGINNERS

Designed for radio students and beginners, this B/C and S/W battery kit gives you the maximum instruction in set building and winding your own coils.

All parts including headphones, valve, battery, etc. included for only £6/18/- (Postage extra). Free descriptive leaflet available.





# BARGAIN RELEASES



**P.M.G.**

## Adjustable Morse Keys

We have made another purchase of these brand new, genuine P.M.G. Adjustable Morse Keys and we are now able to sell them at the ridiculously low price of 10/- each.

**P.M.G. MORSE KEY .. 10/- ea**  
(Without Headphones).

**P.M.G. MORSE KEY.** With brand new Stromberg-Carlson headphones .. .. . **19/6**

Postage 1/6 extra.

**PLEASE NOTE:** These Morse Keys are brand new, ex-Army, and not military rejects.



## REFLECTOR GUNSIGHTS

Ex-Air Force. Containing best quality condenser lenses and adjustable reflector. Parts can be used for many purposes. **£2/10/- ea**

Postage 2/6 extra.

**COMPONENTS INCLUDE THESE VALUABLE LENSES**



1 2 3 4 5 6

No. 1 Diam. 3 5-8 Foc. Len. 10in. No. 2. Diam. 3 1/2 Hollow Ground. No. 3 Diam. 3 1/2 Foc. Length 4 1/2 in.+. No. 4 Diam. 2 3-8 Foc. Length 6 1/2 in.+. No. 5 Diam. 1 1-8. No. 6 Diam. 1 1-8 Amber Coloured ordinary.

Gent's renovated Pocket watches, nickel and rolled gold—7 and 15-jewels. Fully guaranteed. **£2/10/-**  
**PRICE — £4/15/-**

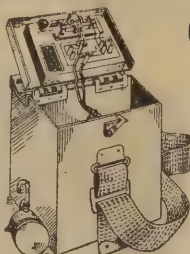
Postage 1/- extra.



## GREASE GUN

Push-type grease guns, ex-Army. 5oz. Slightly used; perfect order. 12/6 each. 10oz. slightly used; perfect order. 15/- each. 10oz. new, £1 each.

Postage 1/- extra.



## Genuine P.M.G. Morse Key, with Light

Complete with Steel Carrying Box, 8in. x 8 1/2 x 7. Worth at least £6/10/-.  
With carrying strap.

## Our Price . . . . 11/6

The Carrying Case, which is complete with shoulder strap, alone is worth the money, or together with spotlight 29/-.  
Postage NSW 3/-; Interstate 5/6.



## Spot Light

Ideal for fishing, hunting, shooting. Brand new. Original cost £2/15/- each.

**Our Price 17/6**  
or together with Morse Key, Light and Case, 29/-.  
Complete with Stand.  
Freight 3/-.



## METAL TOOL BOX, 3/11 ea.

3 1/2 wide, 7in. deep, 15in. long. Ideal for carrying spanners, pliers, hammers, etc. Opens at top and has leather grip handle. Cost the Army 15/- each. Brand new. Out they go for 3/11 each. Post, N.S.W., 2/- extra; Interstate 3/6 extra.

## THERMOMETERS 300 degrees Fahrenheit

Genuine mercury line Armour clad. The Thermometer with a 1001 uses. Brand New ex-Army.

**Price, 15/- ea.**

Postage 1/6



## Rubber One-Man Dinghies

Ex-RAF, brand new. Ideal for fishing, etc., original cost to RAF £15. Price now complete with sea anchor, paddles etc.

**Only £2/19/6 ea.**

Freight and Insurance, 4/6.

## SPECIAL TOOL OFFER

Our offer this time includes spanners that have been unprocurable for the past seven years.

**MAGNETO SET SPANNERS S.A.E. & WHIT MAGNETO SET SPANNERS**

1 5-16 x 9-32  
2 11-32 x 3-8 1 7-32 x 1

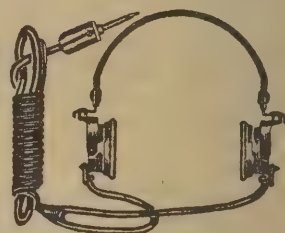
**B.A. MAGNETO SET SPANNERS**  
2 0BA x 1BA 2 2BA x 4BA  
1 6BA x 6BA

1 Ring & open end spanner WHIT 9-16;

1 2lb. Ball Pein Hammer;  
1 Toolbox 3 1/2" x 7" x 15" long.

**The lot for £1/14/6**

Postage NSW 3/-; Interstate 5/3.



## HEADPHONES

Brand new, S.T.C. and Stromberg-Carlson. We have just made another purchase of the brand new 'phones, complete with cord and plug, and we are now able to sell them at the ridiculously low figure of—130 ohms impedance .. . . . **9/6**

Postage 1/6 extra.

2000 ohms impedance .. . . . **£1**

**PLEASE NOTE:** These 'phones are brand new, ex-Army, and not military rejects.

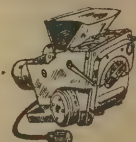
Gent's renovated, latest style, 15-JEWEL WRIST WATCHES — Chrome and Steel Back—Fully Guaranteed.

**PRICE — £4/15/-**

Postage 1/- extra



## BOMB-SIGHTS



Ex-Air Force. Useful component parts include 24v. motor. Best quality lenses, globes, sockets, etc. Cost £100.

Now .. . . . **£2/17/6**

Postage 3/6 extra.

No C.O.D.

## DEITCH BROS

210a George Street, Sydney.



continuous and convenient earth for the various bypass condensers.

The negative filament pins on all sockets can be connected to earth and the positive pins linked together for connection through the switch and cable to the A-battery.

### BATTERY CABLE

At this stage it is a good idea to make up the battery cable and to check the operation of the filament circuit. Use heavy leads for the connections to the A-battery and terminate the leads at the battery end with spring clips. Be very careful, if you happen to be testing the receiver with a 6-volt battery, to clip the leads across only one cell. Only the briefest connection to 6 volts is necessary to ruin the emission of all filaments, even if it does not actually burn them out.

Connect up to the A-battery, plug in one of the valves and switch on. You should be able to see a dull glow down the centre of the valve structure, indicating that the filament is alight. Check the operation of all other valves and the action of the "off-on" switch.

After that, remove the valves and go on with the wiring. Put in the various grid, plate and screen leads and then add the various small components. The job of wiring this set is not very difficult, the main problem being to mount all small components firmly in place. Have a look at last month's article on building your own receiver.

When the wiring is completed, check everything over carefully and connect up to the batteries. A torch lamp in series with the B-minus lead will act as a handy fuse and offer some protection to your valves in the event of a wrong connection.

### TESTING

Making sure that the loudspeaker is connected, plug in the last two valves. Putting your finger on the grid cap of the 1K7-G should produce a hum or squeal as the volume control is advanced, indicating that the audio end of the receiver is alive. Then insert the other valves, connect to an aerial and earth, and see if you can tune a station.

At this stage the set will not be very sensitive, but there should be no doubt about hearing a signal of some description, unless you are in a very remote area. If nothing is heard, the only thing is to switch off and check over the whole job for a possible mistake or faulty component.

If signals are evident, you can go right ahead with the alignment. Assuming that you have no oscillator available, do not touch the I.F. transformer adjustments for the time being.

Tune to a station at the high frequency end of the band and peak the aerial and R.F. trimmers for maximum signal strength. A weak but steady signal is best for this adjustment.

Now tune the receiver to a station at the low frequency end of the band and, if the receiver has iron cores, adjust the aerial and R.F. cores for maximum response on the station. Then loosen the locking screws on the dial and set the dial so that it registers correctly the station you are listening to.

With a variable padder, on the other hand, the technique is to tune to the

low frequency station and vary the setting of the padder while turning the dial to keep the station in resonance. You should be able to find an adjustment of the padder and tuning condenser which will give you a louder signal than any other. Then loosen the dial screws and set the dial to indicate the station correctly on the calibrated scale.

Tune back to a station at the high frequency end of the band and move it to the correct dial position by adjusting the oscillator trimmer condenser, as necessary. Peak the aerial and R.F. condensers again for maximum response.

Next tune to a weak signal very carefully and adjust the trimmers or slugs on the I.F. transformers for maximum

signal strength. Then, if you are keen to make the best of the job, repeat the whole alignment procedure.

If you have a calibrated oscillator on hand, the I.F. transformers can be peaked up to 455 kc. at the outset, after which the alignment procedure is followed, as already set out, for the tuning circuits.

### FOR SALE

Radio, refrigeration, cycle, sports and musical shop. Consider any reasonable offer. No opposition. Country Town. Apply to Box 11824, c/o Radio & Hobbies.

## £100 in Prizes for best suggestions for listening to new personal portable radio

Eveready will pay £2 for every suggestion used.  
Address your entries to Eveready, Rosebery, Sydney.



£2 from Eveready to Mr. J. Logan of Alinga, Oakhampton, West Maitland who suggests that he would wrap a Personal Portable in his saddle blanket to keep him company on lonely driving trips.

£2 from Eveready to Miss M. Connole of Little Collins Street, Melbourne who'd take her Personal Portable to the tobacco kiosk in Century Building where she works all day.

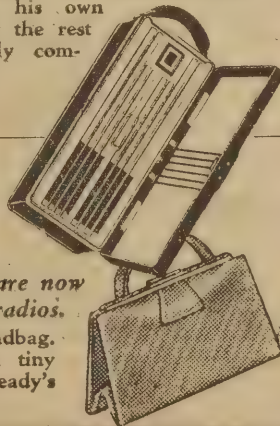


£2 from Eveready to Barry Everett who bought his own Personal Portable from money earned selling papers. Now he can listen to his favourite programmes in his own room without the rest of the family complaining.

## EVEREADY MINI-MAX

All leading radio manufacturers are now making the Personal Portable radios.

They are as easy to carry as a handbag. Their strong, clear tone, in such tiny space, is made possible by Eveready's miracle MINI-MAX battery.





# THE DESIGN OF RESONANT CHOKES

## SOME NOTES ON A VITAL COMPONENT

The trend to the higher frequencies underlines the necessity for effective RF chokes in both transmitting and receiving equipment. Here is a particularly helpful article from the July issue of "Wireless World."

AT high radio frequencies it is a common practice to employ resonant chokes to prevent RF currents from straying into unwanted paths. In the detector output circuit and in the heater leads of RF valves the use of such chokes is not uncommon.

A resonant choke is an inductance which resonates with its own self-capacitance at the radio-frequency concerned. It thus acts as a parallel-resonant circuit at this frequency, and offers a high impedance; because of this the choking action falls off as the frequency departs from resonance. It is, however, effective over a reasonably wide band, and the resonance frequency should be chosen to lie towards the middle of the band to be covered.

### SHARP RESONANCE

Chokes of this kind are not often used at the lower frequencies because the resonance tends to be too sharp in relation to the bandwidth. They could, however, be used in IF amplifiers, but they are rarely needed. They find most application at frequencies of 10 Mc/s and over, where it is possible to use a single-layer winding, and then the design of suitable chokes becomes amenable to simple calculation.

When the coil is wound with a large ratio of length to diameter the length of wire required is one half wavelength. As the ratio is reduced, the length of wire needed is lessened also. This is easily understandable, for shortening a coil increases the coupling and capacitance between turns and so increases the inductance.

Fig. 1 gives a curve showing the value of  $x$  as a function of the ratio length to diameter of the coil, where  $x$  is the number by which the wavelength must be divided to find the length of wire needed.

As an example, suppose that length/

diameter is 4 and that the choke is to resonate to 45 Mc/s. Fig. 1 gives  $x = 2.4$ , and the wavelength corresponding to 45 Mc/s is 6.66 metres.

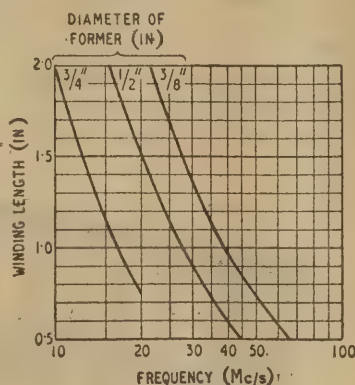
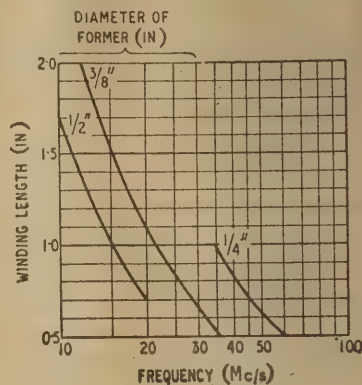


Fig. 2.

These diagrams show winding length as a junction of frequency for various winding diameters, and wire gauges.



The length of wire is thus  $6.66/2.4 = 2.775 \text{ m} = 109 \text{ in.}$  If the diameter of the coil is  $\frac{3}{8} \text{ in.}$ , the length in  $1 \frac{1}{2} \text{ in.}$ , and the length of one turn is  $\frac{3}{8} \times 3.14 = 1.18 \text{ in.}$ , so that  $109/1.18 = 92.5$  turns are needed. The turns per inch are  $92.5/1.5 = 61.6$ , and reference to wire tables shows that No. 28 enamelled wire can just be used with careful winding.

Figs. 2 and 3 show curves of winding length as a function of frequency for a number of different winding diameters, and for No. 36 and No. 41 gauges enamelled wire respectively. They are derived from Fig. 1, and are convenient in design, since they enable one to pick the most suitable dimensions very quickly, and it is usually sufficiently accurate to wind the coil to length without bothering about the actual number of turns.

For 13 Mc/s, for instance, with No. 36 wire, one could hardly use any-

about 30 Mc/s, and the dimension are then so reduced that larger wire is not impracticable.

## 3-WIRE SYSTEM IN MINE REDUCES POWER LOSS

VOLTAGE loss has been reduced 70 per cent. and energy loss to about one-third that of standard 2-line, 275-volt systems, with the same amount of copper, by the installation of a 3-line DC distribution system at Gay Mining Co. The line is along a 4800ft. haulageway, between sub-station and point where circuit branches.

With balanced loads, there is no current in track or grounded neutral. DC power is supplied by one stationary sub-station consisting of two 250-kw. synchronous converters in series, developing 600 volts. The track or neutral conductor is connected to the tie line or bus between the two converters.

If a converter breaks down, or only one is needed, either converter can be disconnected from the circuit and a feeder switch closed, energising both mine feeders. Trolley along crop line is sectionalised, the above and below ground sections being separated. Sectionalising point consists of two trolley-wire section insulators with a 3ft. dead block between them.

For advantageous use of the 3-wire, DC system in mines, the following are prerequisites: two generating units in same sub-station; location of sub-stations close to load centre is impracticable; two widely separated centres fed from junction point several thousand feet away from the sub-station; and also a high load factor.

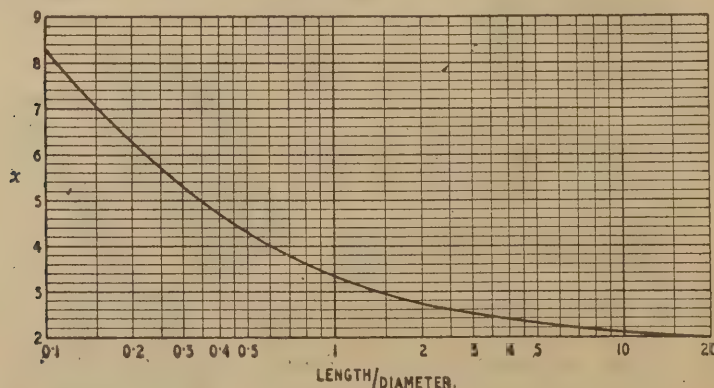
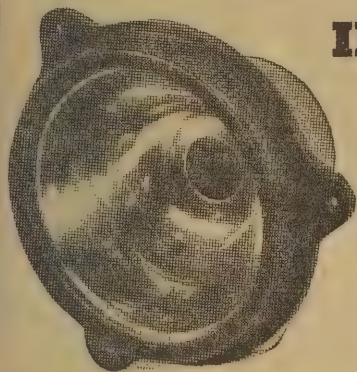


Fig. 1.

Fig. 1.—Graph showing the value of  $X$  as a function of length-diameter ratio.



# **This Month's SPECIAL!**



## **IDENTIFICATION LAMPS (EXRAAF)**

4½ inches in diameter—Chrome Reflector—Black Plastic Case—  
Complete with Lamp Holder of Standard Car Size.  
Supplied with Clear, Amber or Green Glass.

**PRICE 8/6 EACH.**

Additional Glass 1/6 each. Packing and Postage 1/- extra.



### **HAND MICROPHONES**

Supplied complete with matching Transformer. Carbon type, single button.

**PRICE 14/- each.**

DYNAMIC TYPE.

**PRICE 15/- each**

Packing and Postage 1/- extra.

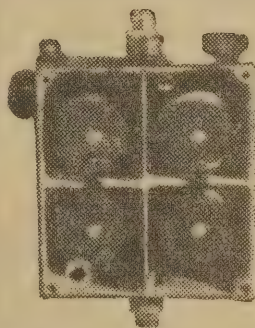
### **Westinghouse Meter Rectifiers**

I.M.A., bridge type, suitable Multimeters, etc.

**Price**

**15/- each**

Postage 6d extra.



**240v. A.C.**

**3A. OUTPUT**

Suitable for noise elimination of motor, radio receivers, generators, etc.  
Dimensions: 4½ x 4 x 2ins.

**Price 12/6 each.**

Packing Postage, 1/6 extra.

### **RACK MOUNTING POWER SUPPLIES**

19 inch Panel 7 inches wide. Input 240v A.C.  
50 C.P.S. Output 250v D.C. 150 M.A.

Also, 6.3v. A.C. Fil. winding supplied with dust cover,  
2 meters H.T. volts and H.T. MAs. Double section choke  
filter with paper condensers and rectifying valve.

THESE UNITS ARE NEW.

**PRICE**

**£6/10/- each**

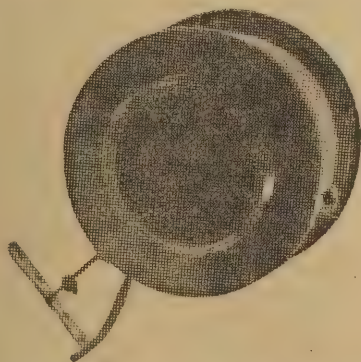
### **Philips' 6 Valve**

### **Communication Receivers**

Range 1-20 M.C.S. in Four Bands.  
Supplied complete with Valves and  
Input 240v A.C. and 6v D.C.

Vibrator, 6U7G, 6J8G, 6G8G, 6J8G,  
6V6G, 6X5G.

**PRICE £19/10/- ea.**



## **PERMAG-SPEAKERS**

BY GOODMAN'S INDUSTRIES, ENGLAND

6-inch Cone, supplied with 5000  
ohm matching transformer  
mounted in attractive metal  
case, dust and damp-proof.

As shown

**35/- each**

# **ELECTRONIC EQUIPMENT CO.**

LM3555

29B WEST ST., LEWISHAM N.S.W.

LM3555



## MORE ABOUT OUR

# Handie-Talkie

Australian listeners have suddenly become portable conscious, and things in the miniature field have been happening fast during the past couple of months. Miniature receivers and kits have appeared on the market, and our own "Handie-Talkie" design has promoted hundreds of inquiries in trade supply houses.

OUR own mail has reflected a very keen interest in this latter set. Many readers have commended the way in which the design combines compactness and efficiency with more or less conventional layout technique. In this way it bridges the inevitable gap between

larger sets and specialised miniature designs which will demand equally specialised components.

The chief reaction has been . . . "We want to build the 'Handie-Talkie' but where can we buy the parts?"

With this in mind we checked again

with various manufacturers to obtain a "progress report" on production. It is one thing, of course, to produce prototypes of a unit and quite another to put hundreds of them on to the market.

A blueprint showing details of the cabinet and chassis was distributed to manufacturers even before the magazine was on sale. The same blueprint, by the way, is available to individual readers through our query service for the usual 2/6.

The answer of a chassis manufacturer was quite positive: "Several hundred have gone out to the trade," he said, "and there are hundreds more on order." So you apparently need have no worry about buying a chassis for the set. With material and labor shortages, the position isn't always as happy as this, but the Handie-Talkie chassis is fortunately a very easy one to produce.

### CABINETS

The cabinet position is less encouraging. Manufacturers are badly up against it for the necessary plywood and skilled labor and supplies to trade houses are likely to be restricted as a result. Fortunately the cabinet is one item which a handyman can put together for himself with the aid of a few scraps and plywood, glue, brads and lacquer. It may lack the finish of a factory made article but will house the set until something better is available.

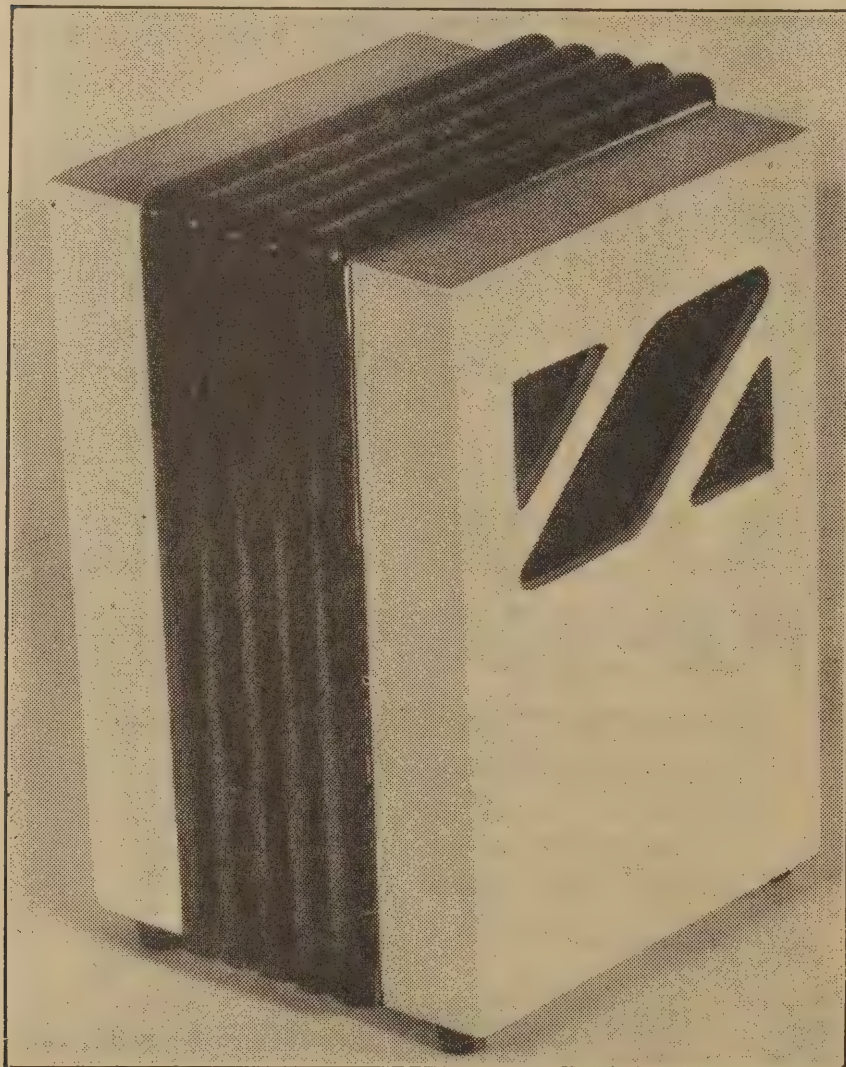
The original cabinet measured 4 3-16 in. wide, 4 in. deep and 6 3-16 in. high, these being inside dimensions.

Incidentally, one sample cabinet we have seen incorporates a rather neat scheme. The ply on one inner wall has been recessed sufficiently to let the loop aerial mount almost flush with the normal interior line of the cabinet. This protects the loop from possible damage and also gets it still further away from the edge of the chassis, thus minimising losses.

### VALVES

Coming to the receiver itself, the valve position is gradually improving. A limited quantity was recently brought forward from overseas and, in the meantime, local valve manufacturers are concentrating on these types, as far as battery valves are concerned.

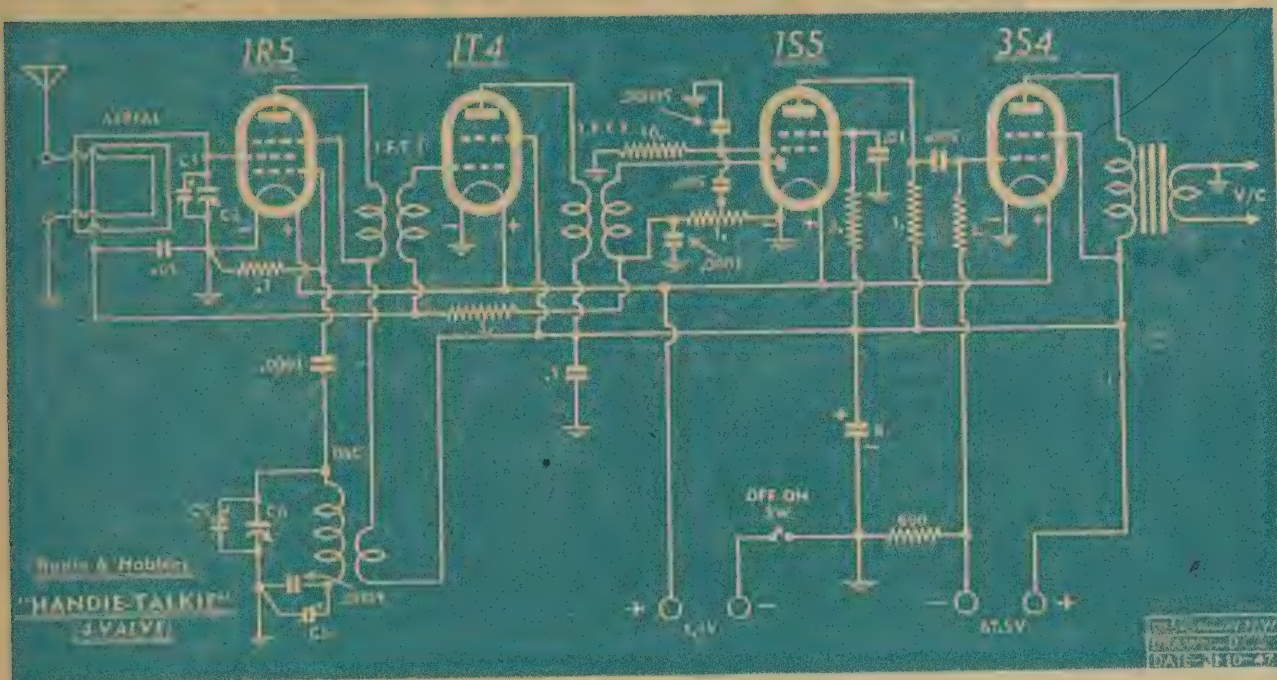
The ordinary 1.4 volt "GT" types are now to be regarded as replacement types only, so that priority is being given to the button-based miniatures.



At least one manufacturer is producing a cabinet for the Walkie Talkie, a picture of which is shown here.



# CIRCUIT OF THE FOUR VALVE HANDIE TALKIE



This circuit shows how to build the set using four valves only when high gain intermediates are employed.

It will probably be well into the new year before you can buy a complete set of valves any-old-time, any-old-place, but enthusiasts should be able to purchase all types by "doing the rounds" of the supply houses in what is now the usual fashion.

We were worried about 3in. speakers, but the position should have corrected itself by the time you read this. It is difficult to promise and to prophecy but, as we write, there is every indication that speakers will be available in one or two brands within a matter of days. Speaker transformers, too, should be in good supply.

We have seen two loop aerals to date which will fit into the available space at the side of the cabinet. It does not matter which one you use, as both should do the same job equally well.

The oscillator coil in the original set was a miniature type, wound on the 0.1 megohm grid resistor required by the 1R5 converter. This is a very neat scheme, so far as compactness is concerned, for the grid resistor can be mounted in place and provides mechanical support for the tiny coil.

## CHASSIS DEPTH

However, we deliberately made the chassis 7-8" deep, so that there would be room underneath for any can-type coil to be installed with dimensions no greater than this figure. Of course, you may have to push one or two components aside to make room for it in a horizontal plane.

This raises a rather important point about miniature sets of any description. As the physical size diminishes, it dictates more and more the use

of components of a certain size and shape. Other components which may be equally efficient electrically may not fit into the available space.

Obviously, therefore, the designs cannot be made as versatile as our larger sets in catering for the widest possible selection of components. We favor the latter course as a matter of policy, but it becomes increasingly difficult to follow in a miniature design.

Electrically, the most significant feature has been the introduction of miniature Australian-made I.F. transformers by at least two manufacturers. These were only in the developmental stage when the "Handie-Talkie" was designed and no definite information was available as to the likely performance of production transformers.

## HIGH GAIN I.F.'s

In the light of this, we based the design on some English I.F. transformers, which were then readily available. The gain of these types is such that we considered two I.F. amplifier stages to be warranted, operating at very low screen voltage, and that was the way the "Handie-Talkie" circuit appeared.

As matters have turned out, the new Australian I.F. transformers are very little behind the best full-size components, so far as gain and selectivity are concerned. So much so, that there is ample gain from a single I.F. stage. If three of these newer transformers are used in the original "Handie-Talkie" circuit, the chances are that instability trouble will result.

Manufacturers could have produced

## PARTS LIST

- 1 Chassis 3' 15/16" x 3 3/4" wide x 7" deep.
- 1 Cabinet 4 3/16" wide x 4" deep x 6 3/16" high (inside dimen.).
- 1 Loop aerial, 4" x 5" oval (approx.).
- 1 Midget 2-gang condenser. (see C2 and C6 below).
- 2 Midget high gain 455kc. IF. transformers.
- 1 Midget oscillator coil (wound on grid resistor).
- 1 3" loudspeaker with 5000 ohm transformer.
- 1 3S4, 1 IS5, 1 1T4, 1 1R5 type valves.
- 1 67 1/2 volt miniature B battery.
- 1 1.5 volt cell.
- 1 Dial Indicator plate.
- 2 Knobs.
- 1 Midget on-off switch.

## CONDENSERS

- C1, C5 and C8 are 2-plate mica trimmers.
- C2, C6 are sections of gang, .0004mfd. each (approx.).
- 1 8mfd. electrolytic, 1 .1mfd. tubular, 1 .05mfd. tubular, 1 .01mfd. mica, 2 .005mfd. mica, 1 .0004mfd. mica, 2 .0001mfd. mica, 1 .00005mfd. mica.

## RESISTORS

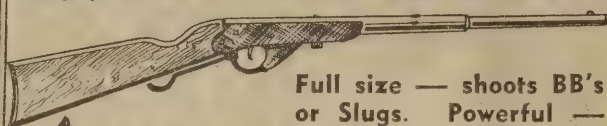
- 1 10 meg., 3 3 meg., 1 1 meg., 1 .1 meg. (all above resistors are 1/3rd. W.)
- 1 600 ohm midget.
- 1 1 meg. potentiometer (small).

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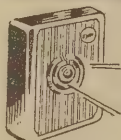
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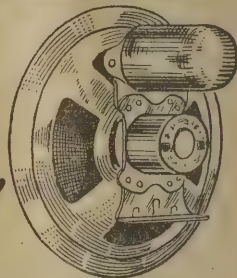


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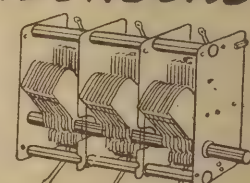
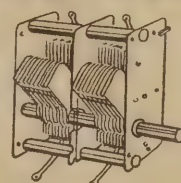
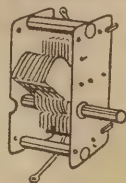
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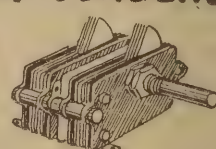
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transformers to meet the requirements of the circuit, but, to avoid confusion, we deemed it preferable to make allowances in the circuit for the higher gain. This is actually quite a simple matter.

### REDUCING GAIN

The gain of the I.F. amplifier stages can be reduced by increasing the value of the screen dropping resistor, R4, to a value of 1.0 megohm, which will incidentally give somewhat increased economy of B-battery drain.

Another simple way of reducing the I.F. gain is to reverse the connections to one winding on one or more of the I.F. transformers. By these methods you can adjust the I.F. channel of the receiver to give you maximum gain without actual oscillation.

However, there is another approach for those who have not yet purchased the components—namely to build up the set as a four valve job. Release of the new local high-gain miniatures has made this an entirely feasible proposition. Just to prove the point, we modified the original chassis along these lines with entirely satisfactory results.

Simply omit the third I.F. transformer and the second IT4, shown as 1FT3 and V3 in the photograph. The 1S5 and 3S4 need not be shifted, so that it will simply amount to having a small blank space between the I.F. and audio valves. You will save quite a few shillings on the cost of parts and still have a very compact and efficient miniature portable. But remember that these remarks only apply to the new high gain transformers.

### CIRCUIT CHANGES

As far as the circuit is concerned, it simply amounts to omitting the extra I.F. stage and the one or two components associated with it. But, to avoid possible confusion, we have drawn up a new circuit referred to as the "Handle-Talkie" (four valve).

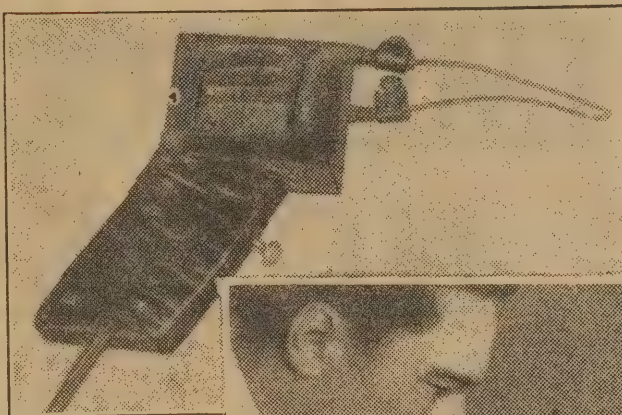
As we mentioned last month the dial plate and knobs especially designed for this set are now on the market in good supply. In fact, we liked them so much that they have been fitted to the new miniature mantel in this issue, the "Radio & Hobbies Minivox."

One final point. Several readers have requested information on the life to be expected from the miniature B-batteries which have necessarily to be used in personal type portable receivers. The facts of the case are quite simple, namely, the smaller a battery is made, the shorter will be its life, both on the shelf and under load conditions. The layer-built construction of modern miniature batteries represents a big forward step, but they are still only miniatures.

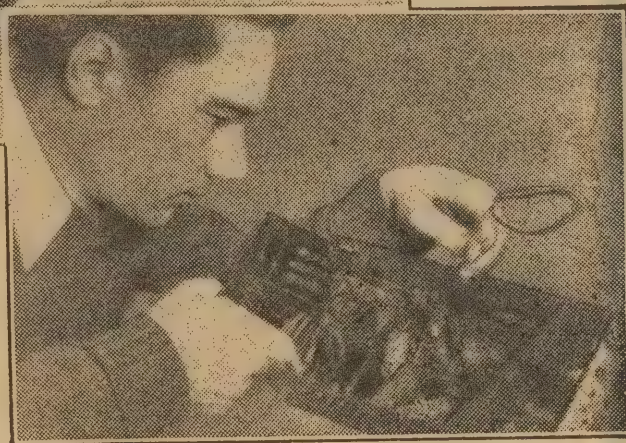
On the assumption of two hours' operation per day, under a typical load of 10 milliamps, the useful life of a miniature 67½-volt battery is about 35 hours. Against this, two of the larger 45-volt portable batteries will give 250 hours of operation under the same conditions.

In the interests of economy, therefore, miniature portable sets should be operated for no longer periods than necessary and switched off for even brief periods when the programme is not actually required.

## MAKING A SOLDERING PISTOL



These pictures show details of the soldering pistol. The idea is capable of many applications.



## A NEW IDEA GAINING GROUND

Here is some useful information on a device which is becoming popular, having special application to light soldering jobs.

The quick-heating soldering pistols now on the market are desired by many hams and radio experimenters, but the cost is too high to warrant the purchase of one by persons who do not use an iron a great deal. These are such handy little gadgets that I undertook the construction of one from parts out of the ever-present junk box. The first one I constructed is still giving good service after many hours of operation.

### POWER SOURCE

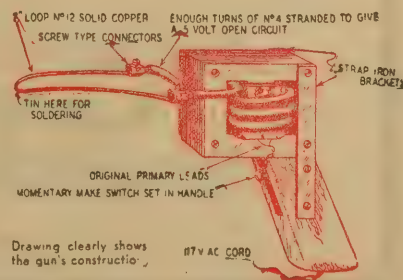
Any small power transformer having a good primary will furnish the basic element for this gun. The case is unbolted and the laminations carefully disassembled. All windings except the primary are removed (the best way to remove the high-voltage winding is to saw through it with a hacksaw). The number of turns in the 5-volt rectifier winding is counted during the unwinding. This will serve as a guide to the number of turns required by the new high current winding, which will be approximately one-tenth of the number counted, for the new winding is to deliver about 0.5 volt to an open circuit. A little experimenting with more or fewer turns might be necessary to arrive at this potential.

When the primary winding is free, the determined number of turns of No. 4 stranded synthetic covered wire is bent around it, secured, and the transformer structure is reassembled

as shown in the diagram. If sufficient space is not available in the core structure to accommodate the covered No. 4, the insulation is removed, and a single layer of friction-tape insulation substituted.

A handle with a convenient switch is attached with two strap-iron or brass brackets, and the primary connected to a line-cord, through the switch and brought out through the bottom of the handle. A 7in. piece of No. 12 solid bare copper wire is bent in a V and connected to the high-current leads with two screw-type connectors to provide a simple and quick means of changing tips. Dip the point of the V in soldering paste, push the switch, and in less than 10 seconds the point can be tinned and ready for work.

The tool constructed in this way is not intended for assembly-line use, but will in all probability serve to great advantage in the home workshop.





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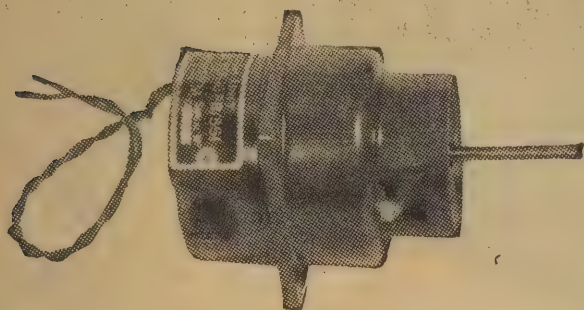
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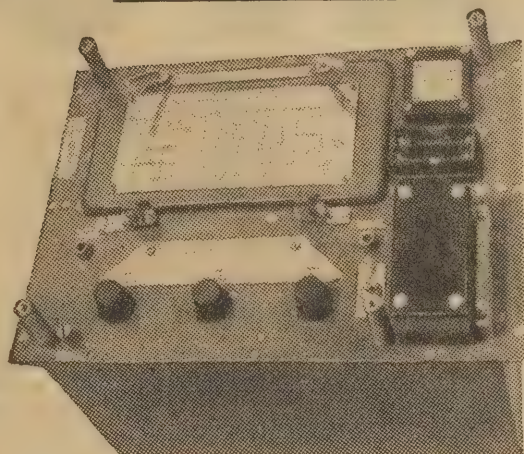
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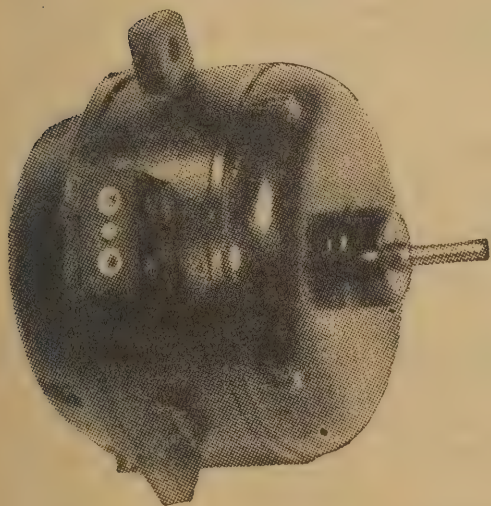


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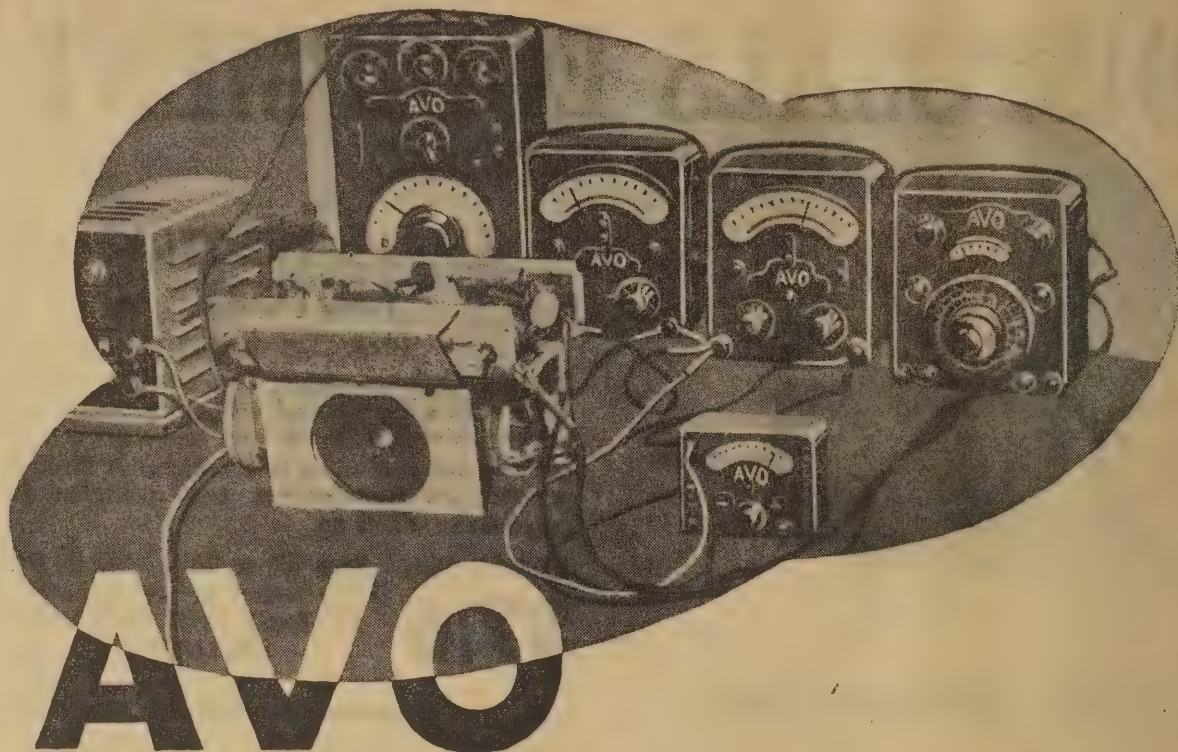


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# FOR THE JUNIOR RADIO EXPERIMENTER

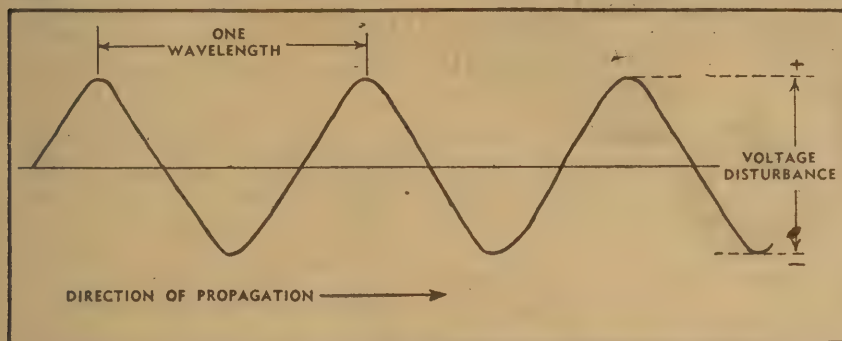
## FREQUENCY AND WAVELENGTH

Sometimes, the newcomer to radio finds difficulty in coping with the relationship between frequency and wavelength. To understand these terms properly one must bear in mind the fact that radio waves travel at the speed of light. This is approximately 186,000 miles per second, or 300,000,000 metres per second.

**T**HE transmission of radio waves through space is usually visualised in terms of electrical stresses and strains in the ether. To use the classical example, if you drop a stone into a pond, ripples radiate outwards in a regular circular pattern. Each ripple

one step further, it can be expressed as 1 megacycle per second or 1mc.

From all this we can derive a simple formula. To convert wavelength in metres to frequency in kc., simply divide into a figure of 300,000. The formula works both ways, so that, if you divide frequency into kc. into



Showing voltage distribution in a radio wave.

represents a temporary disturbance of the water pressure. Think now of an electrical disturbance in space and you can form a parallel mental picture.

The physical distance between two points of maximum voltage stress of the same polarity is called one wavelength. In fact, we can be more general and say that wavelength is the physical distance between any point on a particular wave and the corresponding point on the next wave.

Now remember that radio waves travel at a speed of 300,000,000 metres per second. If a particular signal has a wavelength of say 300 metres, then it would take just one-millionth of a second for one wave to pass a given point. Looking at it the other way, we could say that one million 300-metre waves would pass a fixed point in one second. Being slightly more technical, we would say that a 300-metre radio wave has a frequency of 1,000,000 metres per second.

### FREQUENCY DEFINED

In other words, that is how engineers define the word frequency — the number of complete waves or cycles of the particular signal which would pass a given point in one second. Hence the term cycles-per-second.

But why talk about cycles-per-second when there are more convenient terms available? Remembering that 1000 cycles is equal to 1 kilocycle, we can express the frequency of the wavelength quoted as 1000 kilocycles per second or simply 1000kc. To take the abbreviation

Although the beginner may not, at first, realise it, there are many hundreds of radio waves inducing voltages into the length of wire which may be in use as an aerial.

When this aerial is coupled to the tuned circuit in the grid of the first, or maybe the only valve in the receiver, we can select of these voltages present in the aerial merely by turning the tuning condenser. Therefore, as far as the tuning range of the coil and condenser will permit, we are able to tune to any of the radio stations from which the waves present at the aerial are radiated.

### INDUCED VOLTAGES

The voltages induced in the aerial cause corresponding currents to flow and these currents, flowing through the aerial coil, develop voltages which are ultimately applied to the grid of the first valve.

The aerial is usually coupled to the tuned input circuit by a primary winding. However, more direct coupling is sometimes used by either connecting the aerial wire directly on to the top of the tuned coil, or by tapping it into the coil.

When direct connection is made to the top of the coil, a small condenser is usually connected in series with the aerial lead-in wire. By varying the value of this capacitance, it is possible to effect a change in the apparent electrical length of the aerial wire and regulate the damping imposed by it on the tuned circuit. This, in turn, affords control over the selectivity, the gain and the reaction in small sets.

Tapping the aerial down the grid coil one achieves much the same result, but in a different fashion.

### METHOD OF CONNECTION

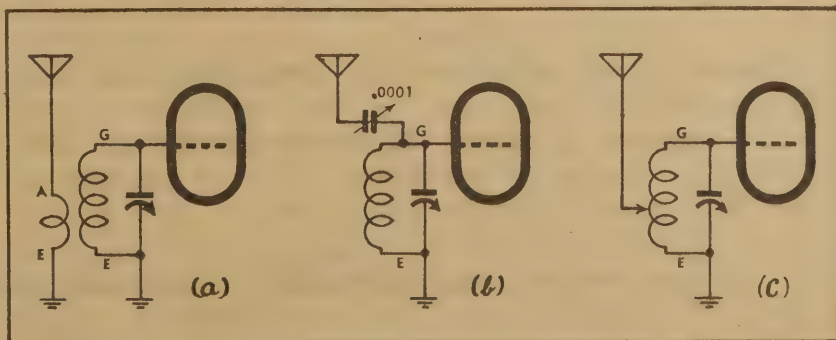
If used, the aerial primary and grid coils are wound on the same former and are then known collectively, as the aerial coil. The small winding, to which the aerial is connected, is known as the primary winding, while the winding which connects to the grid of the valve is known as the secondary.

Correct connection of these windings is important for correct operation. The connections of commercially manufactured coils are clearly marked, in most cases, either by initial letters or by

(Continued on Page 47)

### THE AERIAL

When an aerial "picks up" a signal, it really has induced in it a voltage from a passing radio wave. This voltage will vary at the same frequency as the radio wave which induced it.



Various coupling methods for the aerial.



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.1mfd 250v. Cond's **1/3 ea.**  
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# ANALYSING THE ONE-VALVE RECEIVER

THE set can be built up, as desired, on a metal chassis and fitted with a metal panel. This ensures greater freedom from hand capacity effects but involves extra work in the way of insulating terminals &c. Alternatively, you can use a wooden baseboard and panel, and make all the connections above the base, where they are clearly visible.

The first step, after having carefully scrutinised the circuit, is to go through the "junk box" for the mere handful of parts necessary.

The parts required will be a Reinartz coil, two tuning condensers, two mica fixed condensers, one resistor, one RF choke, a pair of headphones, a valve socket to suit any triode type of valve which you may have on hand, terminals and hook-up wire. Incidentally, the Fahnestock type of clips used on B batteries make up into handy terminals.

## TUNING CONDENSER

The tuning condenser is shown in the circuit as being .0004 mfd. approximately. Any reasonably large value will be satisfactory. The sizes usually found in the junk boxes vary between .0035mfd. and .0005mfd. The larger value of condenser may have a somewhat higher minimum capacity and therefore will not tune to quite as high a frequency as the lower value of condenser. Conversely, the lower value of condenser, having a lower maximum capacity, will not tune to as low a frequency as the larger condenser.

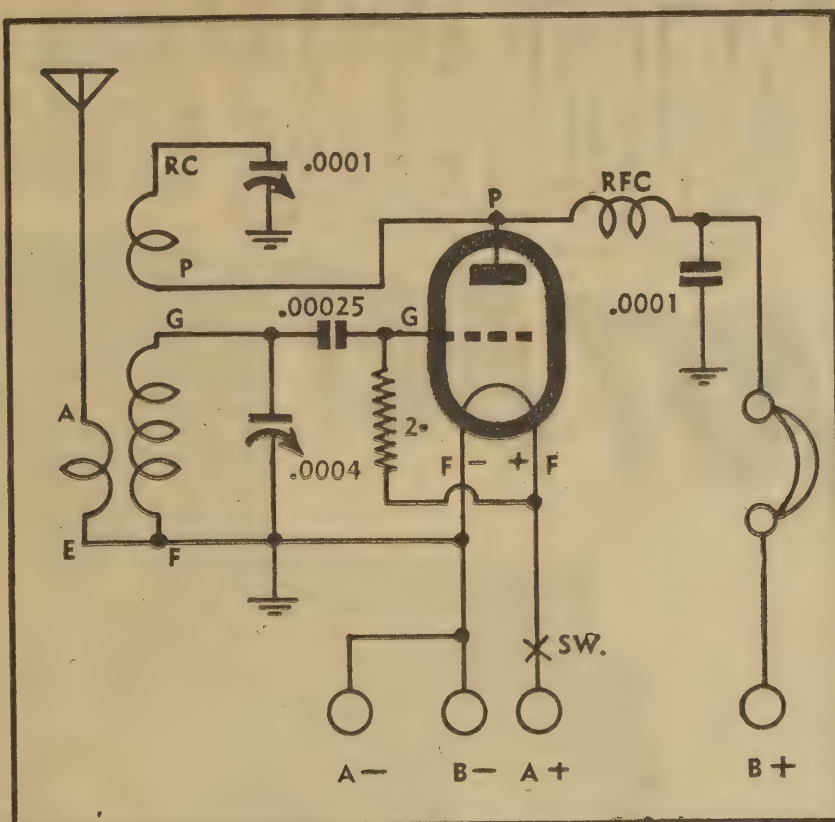
Thus for a given coil, a change in the size of the tuning condenser merely alters the tuning range.

It is interesting to note that one must bear this fact in mind in the larger type of receivers, where a number of circuits are being tuned simultaneously by ganged condensers. Commercially manufactured coils are designed to give a certain frequency coverage when tuned by a given value of condenser. Changing the value of the condenser will alter the tuning range slightly and also the distribution of stations along the dial. The distribution of stations along the dial is, however, affected more by the shape of the condenser plates and, for this reason, the dial used must suit the gang condenser, if it is desired to have the stations tune in on the correct positions.

## REACTION CONDENSER

So much for the tuning condenser. The reaction control condenser permits of wider variation in size. Using the value of .0001mfd., as quoted, the reaction should be quite smooth and its control effective. If a larger value is used, control of reaction should still be possible, though much sharper. In this case, the setting of the control will be more critical.

The connections to commercially manufactured Reinartz coils are clearly marked, either with initial letters or a number code. Connections corresponding to the numbers in the



Circuit of a typical one-valve set.

There is nothing like a few hours experimenting to familiarise a beginner with circuits and components. Here is a basic one valve receiver circuit which can be built up using a variety of parts. Suggestions are made in the article about constants which can be varied to obtain peak performance from each individual receiver.

number code are usually printed on the cardboard box in which it is supplied.

For those who desire to wind their own coil, complete details are available through the shilling query service. These details, with general information, cover the requirements for coils for both the broadcast and short-wave band reception with sets of the regenerative detector type with or without RF stages.

## GRID CONDENSER

The value of the grid condenser is shown as .00025 mfd. This is a conventional value and slight improvement may be noticed with variation of this value either way for the particular type of valve used. The overall result of any variation of this condenser will be noticed in its effect on the smoothness of the reaction control and possibly on the strength of weak signals.

The actual connection and the value of the grid resistor, sometimes referred to as the grid leak, introduces one or two points for experiment. It may be connected across the grid condenser, or from grid to earth, or from grid to the positive side of the filament. As the most suitable connec-

tion depends upon the type of valve used, it can be only decided by experiment.

In any case, improvement, if any, will be slight.

It is interesting to remember that, with detector valves, there are present at the anode (or plate) of the valve two voltages of widely separated frequencies. One voltage is at the same frequency as the signal tuned at the grid and is called the carrier wave voltage. The other is the demodulated—or detector—audio frequency component of the modulated carrier wave.

## AUDIO COMPONENT

The latter voltage is superimposed on the former so that the amplitude of the carrier wave voltage at the plate varies in sympathy with the audio voltage. This audio frequency component is the force which actuates the diaphragms of the headphones.

By using the RF choke as shown in the circuit, the audio frequency voltage only is permitted to pass to and actuate the headphones.

Sometimes a resistor of from 10,000 to 20,000 ohms is used in place of the

(Continued on Page 47)



# THE YORK VALVE BROADCAST MANTEL KIT SET



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# FREQUENCY AND WAVELENGTH

(Continued from Page 43)

numbers. If numbers are used, suitable explanation of the code is given on the carton in which the component is purchased.

In the case of coils wound by the individual, the top of the primary connects to the aerial and the top of the secondary connects to the grid, the bottom end of each winding connecting to earth. If an automatic volume control voltage is applied to the grid, the bottom of the secondary connects to the AVC line instead of earth.

The winding at the chassis-mounting end of the former is usually the primary. This form of connection holds good for any radio frequency transformer.

In the case of interstage coupling such as between a radio frequency amplifying stage and a detector, the plate of the RF valve and the HT respectively take the place of the aerial and earth connections to the ends of the primary.

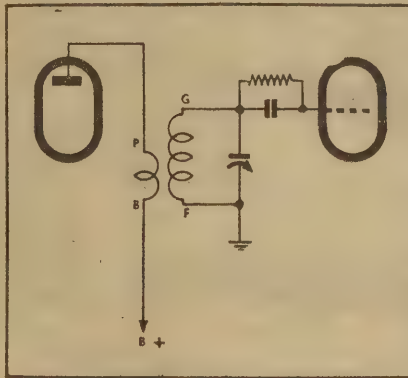
A coil wound for use in this position is referred to as an RF coil. The essential difference between an aerial coil and an RF coil is that the primary of an RF coil has a greater number of turns in order to provide a better load for the valve with which it is used.

The same method of connection is employed with intermediate frequency transformers in superheterodyne type of receivers. Of course, in an IF

transformer, both the primary and secondary windings are tuned to a fixed frequency.

It is necessary for the primary winding of an aerial coil to "respond" to voltages of any radio frequency. For this reason mainly, it is not tuned.

Home wound coils usually have a primary winding consisting of from 15 to 30 turns, compared with about 100 turns for the secondary. These are referred to as low impedance primaries.



Interstage valve coupling

Most commercial coils nowadays have a so-called high impedance primary, consisting of many hundreds of turns, which gives improved gain at the low frequency end of the band.

## A ONE-VALVE RECEIVER

(Continued from Page 45)

RF choke. The result is much the same, though there may be a slight change in the volume. However, it is worth trying just to notice any difference.

The mica condenser from the B plus side of the RF choke to earth is given a value of .0001 mfd. in the circuit. This is again a conventional value, as for the other components.

A condenser in this position provides a low impedance path for RF voltages from the end of the RF choke to the filament of the valve. Thus, any small RF voltage which succeeds in getting past the RF choke will be bypassed direct to the filament of the valve rather than pass through the headphones. For this reason, condensers used in this position and for this purpose in any set are known as RF bypass condensers.

Any type of triode valve will operate in this set from the rather ancient types, such as the 01A, 112A, UX99 to the A405, A415, A615, and through to the more modern types, like the 30, 1H5G, 1H6G, in the battery series, and the 6J5, 56, 76 in the heater type series.

Naturally, consideration must be given to the operating voltage and current drain of the filament or heater. It is well to remember that it is impracticable for the filaments of the battery type valve to be operated from an AC source.

If a heater type of valve is used, the cathode is connected to earth.

The grid resistor will be connected across the grid condenser or from grid to earth, the best position being found by experiment. The heaters will be connected to a filament transformer or a filament winding of the power transformer if an AC operated power supply is used in lieu of batteries.

The B plus voltage requirement will vary according to the type of valve used. If batteries are the only present source of supply, quite satisfactory operation may be obtained from 22½ or 45 volts, particularly from the battery type of valves.

More than about 67½ volts should not be applied to the detector plate in a one-valve set, owing to the likelihood of the valve drawing too much current. This would be undesirable for the valve, for the batteries and for the headphone.

The average type of headphones vary in impedance from, approximately, 2000 ohms to 4000 ohms and these function satisfactorily in sets of this type. There are other types of headphones which are of a much lower impedance and hence do not constitute a satisfactory load for the plate circuit of the valve. However, low impedance headphones can be connected directly in the plate circuit of the detector with an attendant reduction in volume.

A switch has been included in the A battery positive lead to complete the circuit.

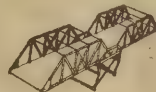
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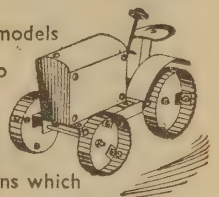
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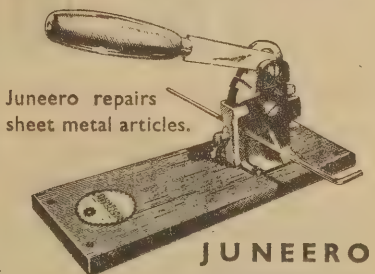
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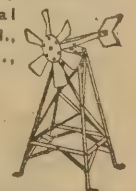
## MENDS IN METAL



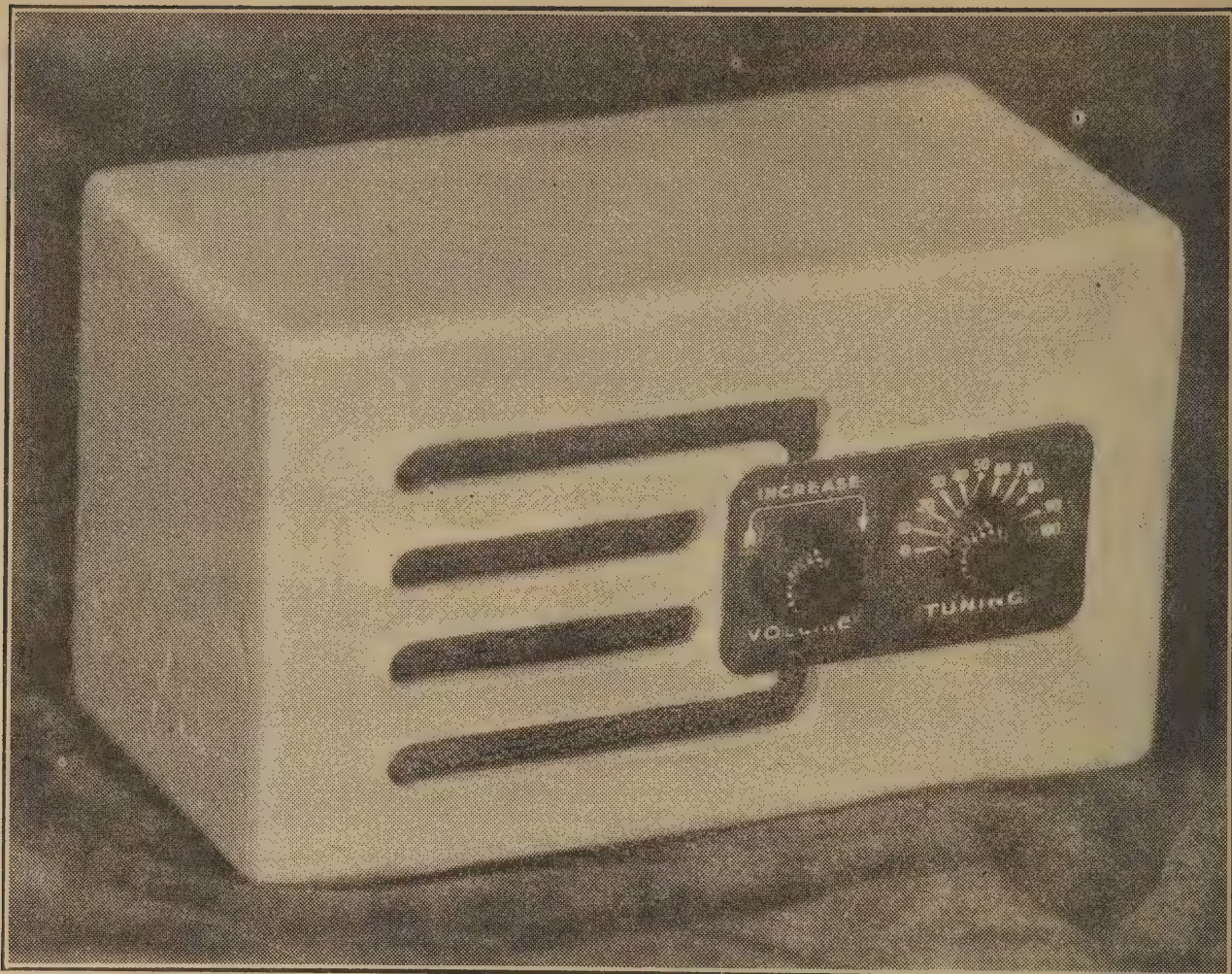
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Our cabinet looked fine, cleaned up and finished in cream. Anyone can make it. It is smaller than any other mantel set we have seen to date.

## THE MINIVOX MANTEL SET

This is the smallest mantel receiver we have described to date. Its modest size and low cost make it an ideal second set with a variety of uses. Although its performance is not quite up to the superhet. circuits, it is by no means a toy, and will give you hours of economical listening.

**T**HIS receiver was developed from a desire to produce the simplest and least expensive mantel receiver we could, without prejudice to performance, particularly on local stations.

Frankly we were somewhat amazed at the success of Tom Thumb, our last baby battery receiver, in the matter of loud speaker reception. It revealed an ability to separate these locals in all but very difficult spots, such as those within a mile or two of stations closely spaced in frequency, and to play them with good volume. A well designed A.C. set, we reasoned, could be expected to do the same thing, and probably do it a good deal better with the extra power available.

Our first step therefore was to build an experimental job on these lines, and try it out. It was so good that we im-

mediately decided to plan a design for description in our magazine.

### SIMPLE CIRCUIT

As regards the circuit, there is very little scope for clever ideas when limited to two valves and a rectifier, without using special types which are not universally obtainable. One valve each is required for the rectifier and output sections of the set, leaving only one more for detection. This means that regeneration must be used in order to obtain adequate sensitivity and gain.

The design of "reinartz" coils these days, with modern methods of winding and iron cores, enables us to get much better results than were possible in the old days. As we have said, both sensitivity and gain are improved, and are adequate for normal listening. Even in

our office, which is a very poor spot for reception, good tone and volume were obtained from most of the Sydney stations. Removed to a suburban area, results were really splendid.

We had an idea that some form of fixed reaction might be practicable to give even sensitivity over the entire tuning range, thus requiring only tuning control and the normal volume knob. We did have some measure of success with several such ideas, but finally wiped them all out in order to retain the simplicity of two controls only.

### AERIAL LENGTH

Because of its loading effect on the tuned circuit, the length of aerial is quite important with this type of receiver. A long aerial will naturally give better volume because of the extra signal pick-up, but it will also reduce selectivity, and introduce the risk of strong stations interfering with each other. Too long an aerial might also prevent the set from reaching oscillation at the top end of the band.



The idea is to use a fairly short aerial, judging the length so that the required balance between sensitivity and selectivity is obtained for any particular locality. We suggest about 6ft. of aerial as being a good all-round figure, but it is subject to variation one way or the other if your results are improved thereby.

If for instance, you should be some little distance from the city area, a longer aerial might be a necessity, and because selectivity will not be such a problem, you might easily find stations receivable over quite a distance, including interstate. This has, of course, been the story attached to such receivers since they were first used, and accounts for the astonishing "logs" claimed by many readers in certain areas.

## VALVES

Dealing with valves, we are forced to use those which are in good supply, which confines the selection to standard types. We used the 6SJ7 because of this fact, and because its single-ended feature helps to simplify layout and wiring. A 6J7G would be quite all right, but a somewhat longer grid lead would be needed because of the grid cap connection. Also it will call for a cabinet a little higher than specified. The 6SK7 will also work well, or, for that matter, any of the other R.F. pentodes. The higher gain types, like the 6AC7, do not seem to work well in this circuit arrangement, probably due to their very high mutual conductance.

The 6V6GT and the 6X5GT are quite standard, the latter being the only suitable rectifier, as the power transformer has only one 6.3 volt winding. Other output valves will probably be too large physically.

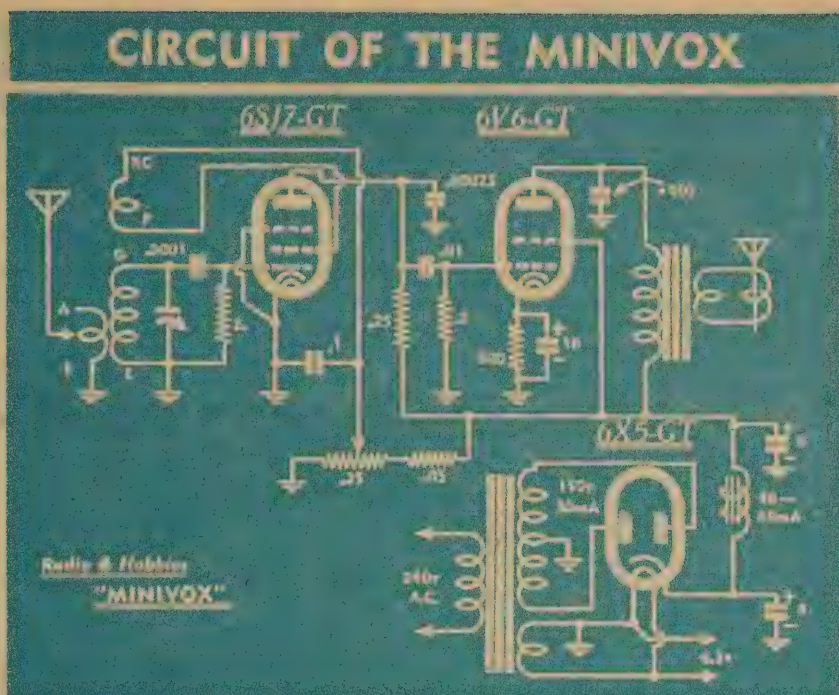
Concerning components, first of all we have used the tiny FN gang condenser, which is about the only type available at present. Using this condenser, any of the standard tuning coils will fit the chassis, either the unshielded types, or those enclosed in cans. Performance in each case is much the same.

## REACTION CONTROL

The use of a potentiometer reaction control we found more flexible than the condenser method, apart from the fact that the control itself is generally smaller in size.

Loudspeakers of the three-inch variety have not been in good supply for some little time, but we are assured that at least one manufacturer will have reasonably good stocks available by the time this issue is on sale.

One quite important innovation represented by this circuit is the use of a newly designed power transformer of small size. We have long felt that most mantel sets are grossly over-powered by using substantially full voltage on the 6V6GT. For one thing, three-inch speakers are not designed to handle large power inputs, and might even be damaged if supplied with too much audio power. There is nothing to be gained therefore, by using a high tension voltage of more than about 150 volts, either in useable output or sensitivity. Even the standard 40 mill transformer, originally designed for the

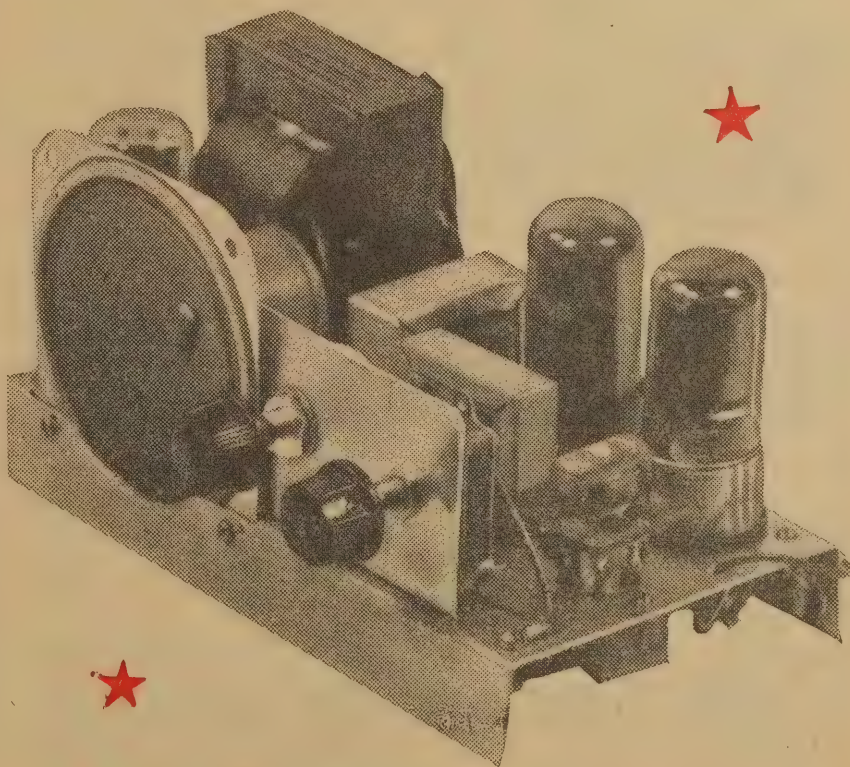


There are only about a dozen small components to be wired in, none of them critical, The easiest-to-make A.C. set you could find.

first Little General many years ago, is on the large side for a small mantel set, and a new approach was considered to be timely.

We have therefore drawn up specifications for a transformer having a secondary of 150 volts per side at 30 mills, with a single 6.3 volt 2 amp filament winding to accommodate the rectifier as well as the valves. The specifications have been supplied to all transformer manufacturers, and the samples

we have seen to date have all worked out well. We are told that supplies will be available by the time these details are published. The transformer will accommodate any small set up to four valves, and we propose to use it for our baby sets from now on. We are inclined to think that most manufacturers will follow our lead in this, effecting valuable savings in space, consumption, and heat generation. The small new type has been tested on a

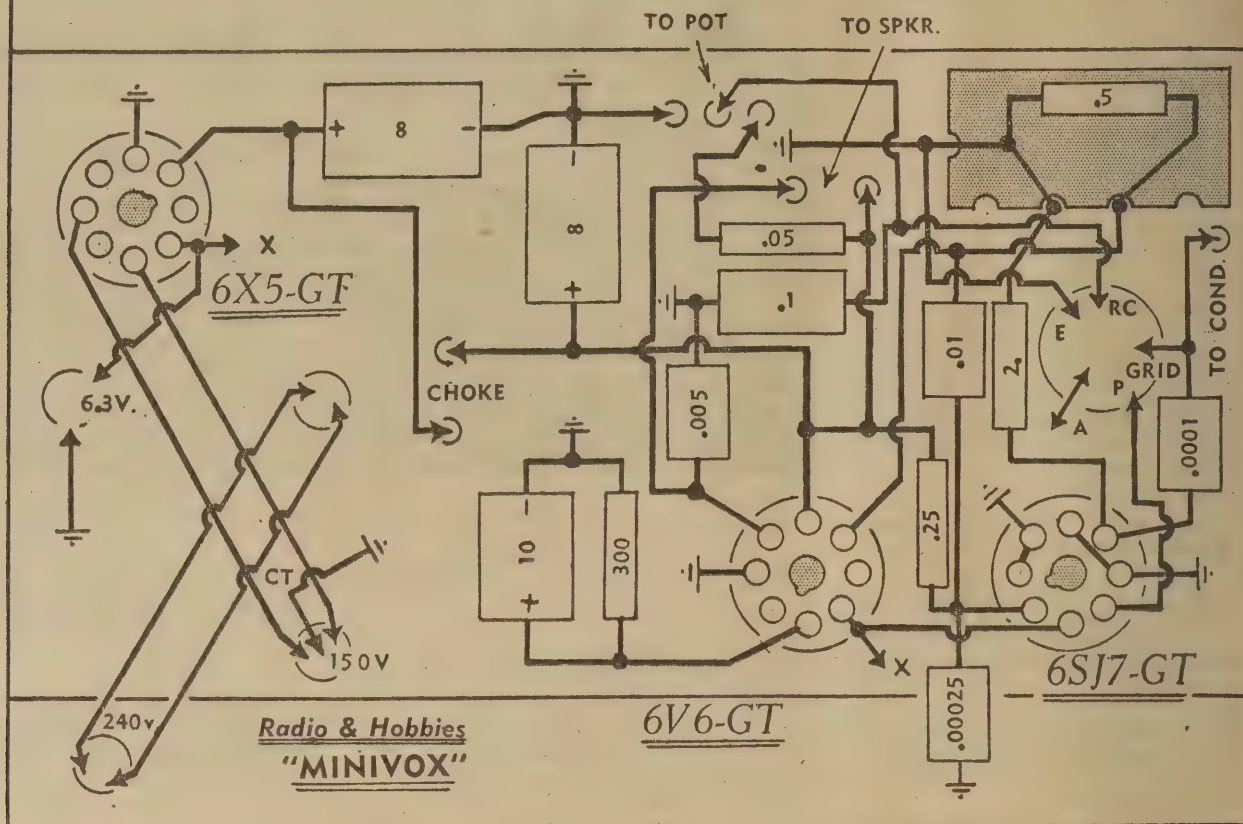


The chassis is so small it can easily be carried about in one hand.



## WIRING DIAGRAM OF THE MINIVOX MANTEL

**MADE ABOVE CHASSIS**



The wiring should not take very long! Use small components for the grid leak and condenser.

continuous run of nearly 48 hours without becoming more than pleasantly warm. By the time the resistance of the filter choke is considered, the available high tension is round the 150 volt mark, plus or minus a few volts.

Incidentally, this transformer should be ideal for small pieces of test equipment where an A.C. supply is called for.

## LAYOUT

In determining the layout, we have concentrated on keeping down size consistent with easy assembly. We could have crammed the parts a little closer together, but with doubtful advantages. At some future date, we plan to de-

scribe a new mantel superhet. for which this cabinet will probably serve, thus assisting all concerned by standardising on cabinet design. However, this is a point which is more in the nature of long range planning than anything else.

In addition to the chassis itself, which should be obtainable ready punched, a small bracket is required measuring 3 x 2 inches with a flange 3-8 inch wide for attachment to the chassis. The centres of the spindle holes are 1 1-8in. above the chassis, are 1 5-8 inches apart, the right hand hole being 1 3-8 inches from the right hand edge of the chassis. You would be well advised to make the holes a

trifle larger than required, to allow for small adjustments in position. The bracket is mounted 1-8 inch back from the chassis front edge.

With this mounting, the small dial plate supplied for Tiny Tim may be used, thus giving finish to the job itself.

Housing the set is something concerning which you can use your own imagination, particularly as you may have available a speaker larger than the small job we used. As a matter of fact, the set will perform better with a larger permag. speaker than with the three-inch size, as larger speakers are generally more efficient, and give more output for the same input.

In fact, we think you'll be most surprised just how well the stations will sound if you have an eight or twelve-inch speaker available.

With such a speaker, the use of a small cabinet would still be OK, running a cord to the speaker mounted in a suitable baffle. It could then be placed anywhere in the room you think best.

The job of constructing a small cabinet is within the capabilities of any constructor. An attractive finish can be obtained by the use of suitable lacquer or enamel, and you can pick the color and design to suit yourself.

## PARTS LIST

- 1 Chassis, 7 $\frac{3}{4}$ " x 4" x 1"
- 1 Reinartz coil
- 1 Midget single-gang tuning condenser  
.00036 mfd.)
- 3 Octal valve sockets
- 1 Power transformer, 30 mill., 150-CT-  
150 volts HT., 6.3v-2a
- 1 Filter choke, 30 mill.
- 2 8mfd Electrolytics
- 1 10mfd. Electrolytic
- 1 .1mfd. paper
- 1 .01 mica
- 1 .005 mica
- 1 .0001 mica

- 1 .00025 mica  
1 300 ohm resistor  
1 50,000ohm resistor  
1 .5 meg. -resistor  
1 2 meg. resistor  
1 .5 meg. volume control  
VALVES. 1 6SJ7-GT. 1 6V6-GT. 1 6X5-  
GT.  
SPEAKER. 3" permag. (transformer  
mounted on chassis)  
SUNDRIES. 2 knobs, hook up wire, nuts  
& bolts, spaghetti, bracket for mount-  
ing condenser & reaction control, power  
flex, solder-lugs etc.



# "VIBRAPOWER"

## ***Replaces B Batteries***

The "Vibrapower" unit is a complete self-contained unit weighing only 10lb. Designed to operate from a standard 6 volt accumulator, it may be used as a replacement for B batteries.

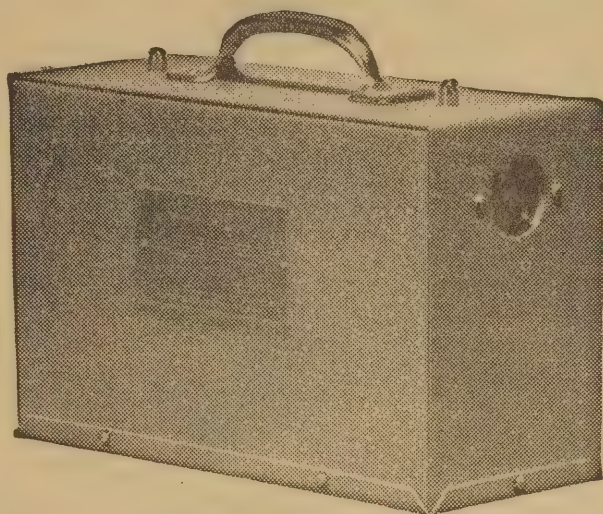
The fabricated steel case measuring 9½ in. x 6 in. x 4 in. is finished in grey wrinkle duco and is fitted with rubber mounted feet.

Two output circuits are provided, one is a filtered low tension 6V filament supply, which can be used with current drains up to 300ma. The second is the normal high tension supply, which will deliver an output current of 20ma (max.) Under these conditions the output voltage is 140 volts D.C.

Both L.T. and H.T. outputs are adequately filtered for A.F. and R.F. noise.

INPUT 6v. at 0.95 Amp. OUTPUT 140v. at 0.02 Amp.

Input and output connections are made of a standard six-pin plug, which is inserted in the socket provided.



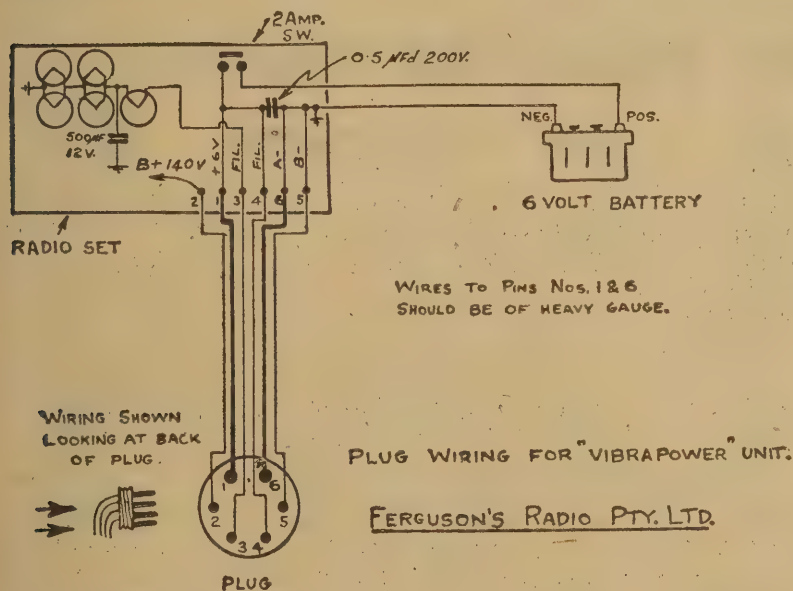
## **OUTSTANDING FEATURES:**

One of the outstanding features of Vibrapower is that either a Ferrocart Type P.M. 413 or an Oak Type V5124 vibrator cartridge can be used without any change in the operation.

When installing a Vibrator cartridge, the six screws holding the base of the case should be removed, the lid slid off, and the cartridge inserted.

### **STOP PRESS:**

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"Q PLUS" MIDGET I.F.'S. MEASURING  
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## FULL SIZE PERFORMANCE

**In a  $\frac{3}{4}$  in. X  $\frac{3}{4}$  in. Jacket**

"Q Plus" Engineers are justly proud of this ultra-small I.F. transformer. Many ways were open to obtain a small physical size, but with a decreased electrical efficiency, but we are proud to announce that **NO LOSS OF EFFICIENCY FROM STANDARD SIZE I.F.'S HAS BEEN MADE.**

Full 100µfd. negative temperature coefficient condensers are used and full 5/41 litz wire too.

The secret of course is the exclusive "Q Plus" Ferropreg treatment of both coil and can. (PATENT APPLIED FOR.)

Mounting this tiny unit was a problem because any side mounting method took up valuable space—"Q Plus" have used a single hole mounting, with special shoulders to prevent the terminals shorting to the chassis. You will see these when you obtain your first pair of "Q Plus" midget I.F.'s.

Earthing the shield too was important and that is why the four little lugs neatly folded inwards all press firmly on to the

chassis, not just one or two, but four, for even pressure and good contact.

*Lugs* for soldering were the subject of much pondering too. No doubt you will be placing resistors and other components right underneath this little transformer, and would need a short stubby solder lug which would solder well and prevent dry joints, examine yours, we know you'll like them.

*Gain*—We realised that you will need every bit of gain from your personal portables and so we have provided a No. 1 and No. 2 I.F. No. 2 being more closely coupled to overcome the loading of a diode detector, please don't reverse them as performance of your set must suffer.

*Connections*—Terminal connections are moulded into the bakelite base, this like all "Q Plus" mouldings is of high-quality phenolite bakelite and does not melt away when treated by your soldering iron.

*Christmas*—The staff and engineers of the "Q Plus" organisation wish you the happiest of Christmases and a prosperous 1948.

**R. W. STEANE & Co., Pty. Ltd., KEW, VICTORIA**



The cabinet pictured with this article was our technical editor's idea of it, and you must admit it looks very well indeed. After all, there is a certain pride you will feel when the job is done, and you can exhibit the set as being completely home constructed, cabinet and all!

## THE CABINET.

Eventually you may be able to buy the cabinet from radio stores, just as for other designs. In the meantime, it can be made up quite simply by the average handyman.

Basically all you need is a simple box, without back, measuring eight inches wide, by 4 1-8 inches deep by 4 1/2 inches high, these being inside dimensions. It can be made up from a few scraps of 5-ply.

The two end pieces for the cabinet must obviously be 4 1/2 in. x 4 1-8 in. Assuming that you use plywood 5-16 in. in thickness, the top and bottom will measure 4 1-8 x 8 5-8 inches, while the front will be 8 5-8 x 4 7-8 inches. Due allowance will have to be made for timber of other thickness.

Cut and square the various pieces and assemble them with a good carpenter's glue and fine brads. Fill any troublesome cracks with a mixture of glue and powdered wood and set the rough box aside for a few hours, for the glue to set.

Next operation is to round all edges and corners, using a fine plane or a rough file. Be careful not to chip or split the edges of the wood as you work. Use the file with a scooping action on the edges and you will get a smooth finish. Then give the cabinet

a good sanding with two grades of paper, to remove all indentations and bumps from the surface and to merge the rounded edges into a smooth contour.

Next job is to mark out the front of the cabinet for the dial plate and the speaker fret.

Draw a pencil line horizontally across the exact centre of the cabinet and rest the dial plate on the upturned front so that the centre line bisects two control holes. The right hand edge of the dial plate should rest about 5-8 inch from the inside surface of the cabinet wall, or a fraction under an inch from the outer edge of the cabinet, assuming 5-16 inch plywood sides.

Mark the position for the tuning and volume control spindle and run a pencil line around the edge of the dial plate.

To mark for the speaker grille, draw a horizontal line 7-32 inches either side of the centre line. Then draw three other horizontal lines 7-16 inches above and below the ones you have just drawn. The spaces between these

lines have to be cut out to form the speaker fret shown in the photograph of the cabinet.

Drill four 3-8 in. holes 1 1/2 in. from the left hand edge of the cabinet in the spaces which have to be cut out. Then drill two other holes just clear of the edge of the dial plate and two more in exact line with the volume control hole.

The unwanted wood can now be cut out with a small keyhole saw, the outer frets being cut so that they turn inwards in line with the "volume" knob.

Clean up the cuts with a round and flat file and polish the surface with a scrap of folded sandpaper.

Give the cabinet several coats of lacquer, allowing each coat to dry and sanding before applying the next. Attach the dial plate with four small screws or brads, add four rubber feet and stretch a piece of cabinet silk behind the fret. Put the chassis in place, attach the knobs and the completed set is ready for the mantel shelf or whatever other spot you have reserved for it.

## KIT SETS

Absolutely complete, including high impedance headphones and full building instructions.

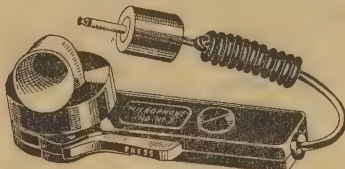
**LITTLE JIM'S MATE.** All battery operated. £5/11/2  
including batteries but valve 1J6G extra ---- 18/10

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Valves 6J8G and 5Y3G extra £1/15/11 All Prices Plus Postage

**W. THOMPSON, 29 BEMBRIDGE STREET, CARLTON, N.S.W.**



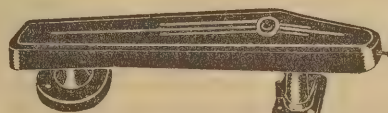
Two pin chassis plug and socket. 1/-.



Microphone with press switch and plug. 7/6.



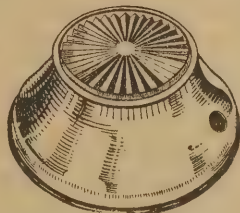
Coil winding wires, 40z. reels, from, 1/9.



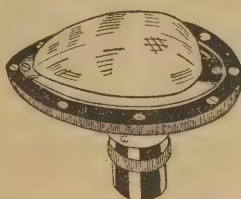
"Cosmocord" crystal pick-up, English make. 57/-.



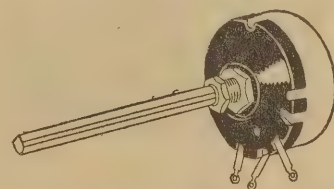
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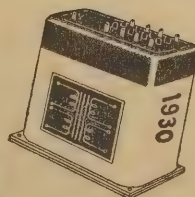
Plastic 6 pin Dimmer switch formers, 1 1/2". 2/9. rheostat. Low voltage. 1/-.



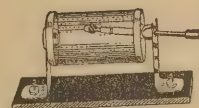
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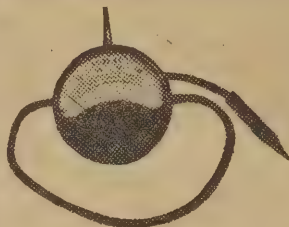
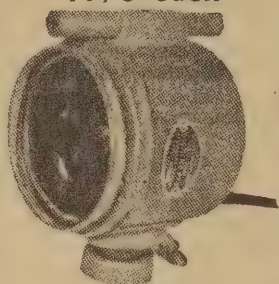
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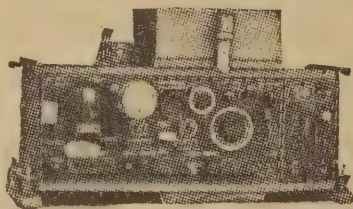


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# OUR READERS SAY —

## About Broadcasting

I WOULD like to add how much I appreciate your paper, but I have one bone to pick with you. Yes, sir! Issues are too far apart! But to make up for that nasty crack I would compliment you on your attitude to broadcasting. We do hear too much trashy American transcription hash from some stations. Also I think it will be degeneration, as you do, if broadcasting ever becomes nationalised. The ABC gives us many fine programmes but we all like to tune the commercials for a change.

I have also been interested in what you have had to say about Frequency Modulation. Personally, I doubt that it will ever be half what some people crack it up! I don't know much about that sort of business, but what can FM do that pulse modulation can't! Or even straight AM on very high frequencies, for local service? PM also has one advantage, from articles you have published, several programmes can come from the transmitter, thus saving quite a lot of money for installations. Yes, perhaps I'd better dry up, before I show myself right up. But still I do wonder.—C. Gates, Balladoran, NSW.

★ ★ ★

## Needs Assistance

I OBTAINED a MCR1 British Commando Midget Com. Receiver and wonder if you know of the circuit and of any improvement which I can make to the set. The quality is high, which is to be expected. Maybe some other reader may have written to you of their experiences.—J. F. Manly, 630 Toorak-road, Toorak.

★ ★ ★

## Discs For Dancing

IF any of your subscribers want names of records suitable for dancing, old-time, I may be able to help. I know I would have liked some such help when I started out first. Quite a lot of the newer recordings are suitable for old-time dancing. Incidentally "The Serviceman Who Tells" isn't quite right when he says dancers would not be keen on "canned music." He ought to see my crowds.—E. Sant, Sofala, NSW.

★ ★ ★

## In Appreciation

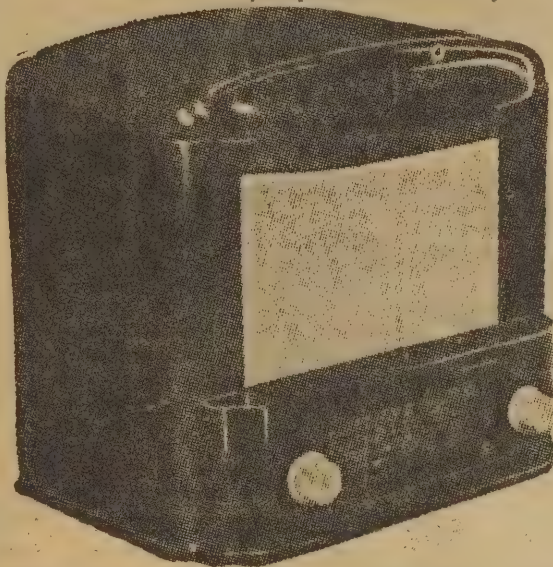
I WOULD like to take this opportunity to say how much I appreciate your magazine. I have read every issue and have never once been disappointed. I have found your articles on theory, in particular, very helpful, and, thanks to them, have acquired a very useful knowledge of radio. Wishing your magazine every success in the future.—V.H.M., Bororen, NC Line, Qld.



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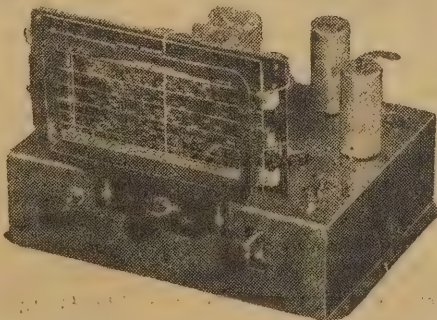
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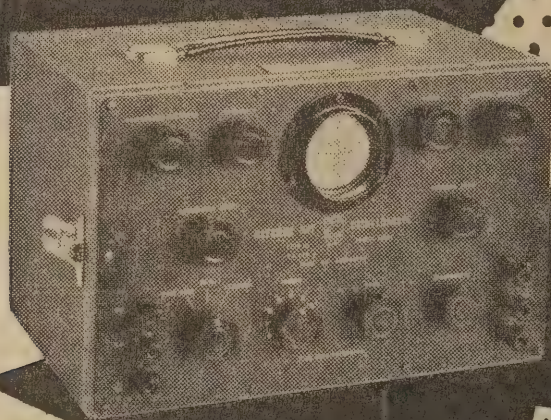
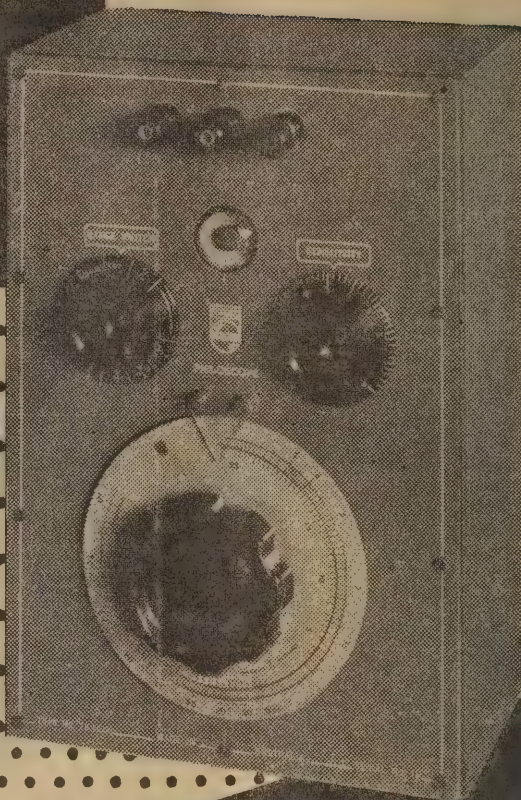
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**I**NSTANTANEOUS recordings have a basic resemblance **ONLY** to disc recordings of the type known as "processed." The instantaneous disc can be played back immediately after cutting without any treatment whatever and, with proper care, it will give at least 100 playings before surface noise and distortion become intolerable.

**T**HE main constituent of the blank disc is either cellulose nitrate or cellulose acetate, and a plasticiser and solvent are also present. The coating is spun, sprayed or rolled on to an aluminium or sometimes a glass base, the depth of coating being usually between 5-1000-inch and 10-1000-inch.

The disc hardens with exposure to free air and develops rather unpredictable cutting characteristics. It may go hard in patches, causing intermittent regions of high surface-noise, or it may harden uniformly; but in either case becomes virtually useless. Therefore, it is usually transported and stored in special tins.



Above.—A commercial type recorder makes a disc of a performance taking place behind the double glass window looking into the studio. This window enables the operator to see what goes on although there is complete sound proofing between.

# MORE ABOUT RECORDING TECHNIQUE

In the last two or three issues we have presented articles on disc recording, compiled by the Technical Editor, and intended especially for amateur enthusiasts. This more comprehensive series of articles covers the same general ground, but from the point of view of one who has personally built up and operated a professional recording studio.

Leading manufacturers in this country use distinctly different combinations of materials in their blank discs. They look different under a strong light, they smell different and—most important—they behave differently during the cutting process. One type tends to be a little noisier when cutting—but it has a longer effective life than the other.

Both types, incidentally, respond well to a special softening treatment, which is carried out immediately before cutting. A small wad of absorbent cotton is soaked in butyl acetate and placed in a perforated container. I have used an old gramophone-needle tin with a dozen or so holes drilled in it. The loaded container is placed in the tin of blanks and the blanks are then exposed to the vapors of the butyl acetate for about 30 minutes. It is found that this will soften the critical upper layer of the disc coating—that is, the top 2 or 3 thousandths of an inch. Excessive exposure causes stickiness, and is to be avoided.

The disc is then ready for cutting, and we shall next examine the cutting needle, known to the profession as the cutting stylus. The plural of the word, incidentally, is "stylii."

The stylus for recording is like a miniature lathe tool, with a radiused cutting edge. The "business end" of the stylus is traditionally sapphire, but stellite, and even high-grade steel, can be used. Surface noise is higher because the latter materials cannot take a high polish like the sapphire. The shank of the stylus is aluminium alloy, and the overall length is, roughly, half an inch. Only the jewelled tip

protrudes from the chuck of the cutting head.

The cutting face attacks the disc surface at an angle of between 90 degrees (vertical) and 85 degrees. The latter sometimes proves the better choice, since, if the disc has a slight buckle, there is a danger that the stylus may go **past** the vertical to form an obtuse angle with the disc surface. The cutting head will then bounce—a sort of chattering action.

## DEPTH OF CUT

The depth of cut is about 2 to 3 thou., and the track is a concentric spiral. The sound wave is engraved with lateral swings of the stylus. The correct cutting depth is achieved when the ratio of groove-width to width of uncut material is 60-40.

It will be seen that the amplitude of the stylus swing, under audio excitation, is restricted by the possibility of the sidewall of one groove breaking into that of the adjacent groove. This is called "overcutting," and its effect is a matter of degree. If the sidewalls do not actually break down, the effect will be an "echo," called "sidewall chatter," which is most annoying, especially at the lower speeds. If the breakdown of the sidewall is complete, the playback pick-up may fail to track properly.

by  
**G.P. Edwards**



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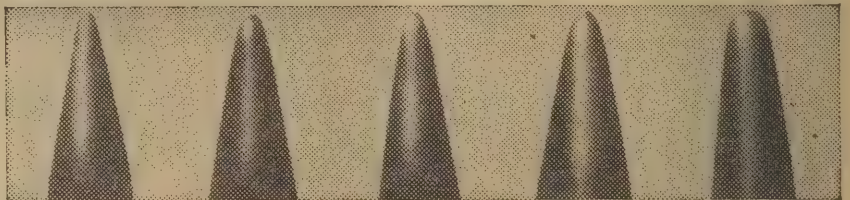
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## MICROPHOTOS REVEAL AMAZING DIFFERENCES



Illustrations above and below are from microphotos, enlarged 50 times. The top row shows points of five different kinds of needles, taken at random from stock purchased. To the unaided eye they seem much of a muchness—but examine these pictures closely. See how the radii vary—how irregularly the points are shaped. What chance has a poor groove when it gets treatment like this?

Below are microphotos of A.R.C. Precision Styli, taken under exactly the same conditions.



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The other extreme is a soundtrack with so small an amplitude that the signal-to-noise ratio is low, and a compromise has to be struck. The upper limit of the amplitude is helped very greatly by modern systems of **volume compression**, which will be discussed in some detail later.

The residue scooped out of the disc surface is about the thickness of a single human hair, perhaps a trifle thicker. It should come off as an unbroken thread, shiny in appearance, and not crinkled. Any dullness indicates that one or both of the sidewalls is not smooth, due to the abrasive action of an imperfect cutting edge.

## CUTTING PITCH

The standard cutting pitch—that is, the number of grooves to the inch—is 112. The permissible range of cutting pitches is from about 94 to about 150. The more elaborate commercial machines have an instant pitch adjustment which helps them to accommodate loud passages in an orchestral score, without unduly compressing the level. The figure of 94 would represent an amateur recording machine, and the figure of 150 is a special fine pitch, which has been used for long-playing speech recordings.

It will be noted that playing time has a direct relationship to pitch. A fine-pitch "cut" will play for longer than a coarse-pitch cut. The offsetting factor is, of course, the severe limitation placed on the permissible amplitude which can be recorded on the fine-pitch cut.

The residue can be dealt with in any of three ways. It can be drawn off by a vacuum pump, situated behind the cutting head; this is a commercial system, but is rather unpopular because the hiss of the pump tends to drown the monitor when the signal-level is low.

Secondly, the residue can be brushed off mechanically—either by hand or a wiper-blade behind the head, which guides the "scrap" in towards the spindle of the turntable.

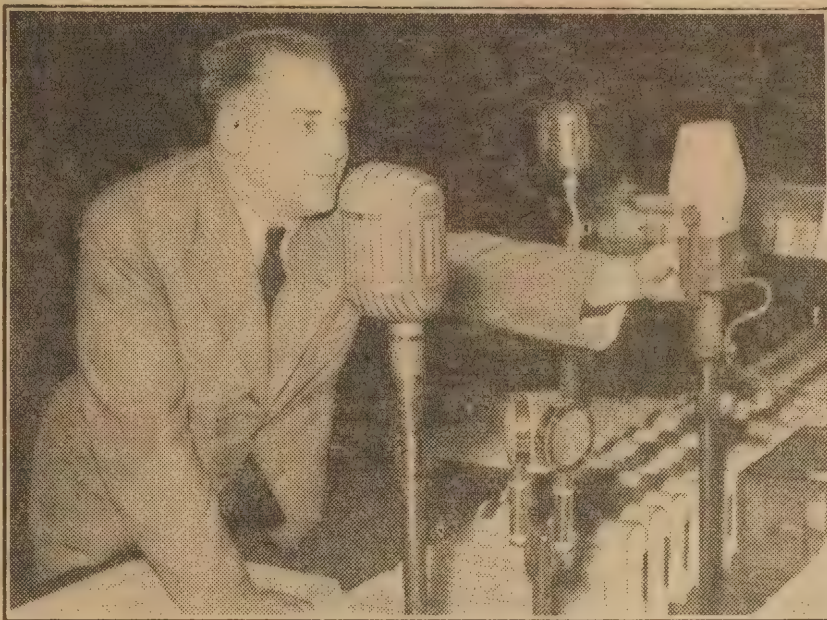
## INSIDE START

Lastly, and best of all, there is the inside start cutting traverse. A properly-set stylus will always throw the scrap to the spindle side of the cutting head—that is, towards the inside of the disc. By traversing the head from spindle to edge of the disc, the scrap is left behind all the time. This neatly solves the problem, and accounts for the reason why many commercial transcriptions are labelled "inside start."

If the thread fouls, the head will be momentarily thrown upwards, and at that part of the disc there will be no groove.

Next, the question of the traverse. There are two basic mechanisms. One is the overhead lathe-type, which has a straight-line drive across the disc. This system tends to be rather dubious mechanically, and unless perfectly manufactured and adjusted, develops a "limp" with each revolution of the spindle, from which the traverse is driven. This causes irregularly spaced grooves, which means the equivalent of a fine pitch in some places and a coarse pitch in others.

# A BATTERY OF MICROPHONES



Various types of microphones are used for recording, ranging from the simple crystal to more expensive dynamic and ribbon types. Speech requirements are not as severe as those for recording music.

The other drive system is the sub-chassis "fan" type, with a vertical fibre worm-and-pinion unit, which in turn drives the teeth of a fan-shaped sector-plate. The arm supporting the cutting head is rigidly attached to the fan, and thus the traverse is effected.

The fan type has the advantage of being protected from dirt and damage, although with the fan type the cutting surface of the stylus fails to cut at the optimum attitude, because the cutting stylus describes an arc. Even this slight fault is overcome in some machines, by providing for the cutting head to be rotated slowly, so as to be always at right angles to the oncoming disc surface.

## TURNTABLE

The turntable itself is often of cast aluminium, with ribs for reinforcement. The rubber tyre around the rim is one of the driving surfaces. The turntable may weigh anything from a few pounds upwards. The heavier the better, for a studio installation, because its greater inertia of the heavy table. The turntable shaft rides on a single quarter-inch ball in the bottom of the well.

The drive is from a synchronous motor, by a wheel on the motor shaft, which bears against the rubber tyre, to give a friction drive. The pressure with which the pulley bears against the tyre is most critical, and is made adjustable.

## DRIVE TENSION

If the pressure is too heavy, mechanical vibration will be caused by the motor-shaft being pushed off-centre. This comes out on the finished disc as a low-pitched rumble or hum, and leaves a pattern on the disc like the spokes of a wheel. Amplifier hum will cause a similar pattern.

Another point is that, with excessive pressure, the effective driving circumference of the turntable is reduced when the pulley presses deeply into the tyre.

If the drive tension is too light, the drag of the cutting stylus will cause the turntable to slow down, and, when the disc is played back at the normal speed, all the voices and musical instruments have an unnaturally high pitch. The effect is worst at the rim of the turntable, where the greatest driving-torque is needed to overcome the drag of the stylus.

Of course, the classical gravity-drive has not altogether disappeared. In one system, a 70lb. weight drops through about eight feet in 15 minutes. This is an example of a mechanically pure drive system, and the speed regulation approaches the ultimate in perfection.

## CUTTING HEAD

Now, to examine the cutting head. It is definitely not merely a magnetic or crystal pick-up used in reverse. While this conception may be true in theory, in practice the cutting head is an electro-mechanical device of great technical development. Its power-handling capability, its frequency response, its behavior in handling transient and complex wave forms, its mechanical and electrical damping, the efficiency and strength of its magnetic system are all critical, and it is larger and more complicated than a simple pick-up. A reasonably good professional cutting head in this country costs about £110 plus tax, while a typical cheaper head costs about £65. Amateur heads sell in the region of £25.

The magnetic field may be "per-

(Continued on Page 83)





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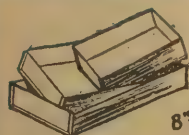
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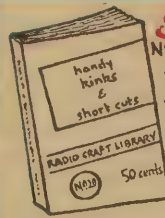


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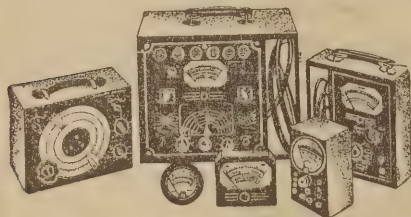
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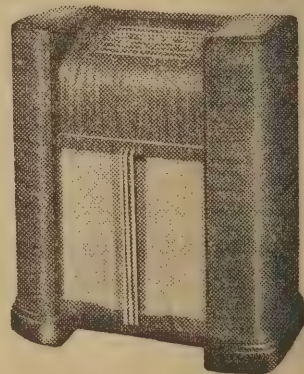
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# MAKING A DYNAMIC MICROPHONE

With a few simple modifications, ex-army dynamic earphones can be converted for use as speech microphones—excellent for use in amateur stations or in office communication systems.

**T**HOUSANDS of these earphones were bought by enthusiasts for just this purpose, but with indifferent success. The resultant speech quality, though clear and crisp, is far too high-pitched for pleasant listening. Much the same remarks are true also about dynamic microphone inserts, of rather similar pattern, which were available from disposal sources.

It would appear that the high-pitched quality is due in part to the heavy air-damping behind the cone. The pole faces conform closely to the shape of the cone at the rear, and there is little or no relief for the pressure built up in the confined space. Thus the cone movement is severely restricted at low frequencies.

## AVOIDING RESONANCE

With this in mind, some experimenters have cut away sections of the cone support around the edge, but this makes the unit unduly susceptible to blasting effects, and the general quality is still poor.

A rather better scheme is to remove two of the four long bolts which pass right through from the rear of the magnet assembly. The relief afforded to the back pressure allows a marked improvement in tonal quality.

But here a word of warning. It is essential to drill a network of holes in the rear of the bakelite housing, when this is done, to avoid secondary reflection and cavity effects from this space.

Observe, too, the quality with the front cover in place or removed. It is a simple matter to cut out the centre of the front cover, to expose the whole active portion of the diaphragm. These are all more or less general



The completed microphone.

sultant ring and fold it round to form a cone.

You will need a cone of about the same taper as the one already in the earphone unit. Trim off the excess paper and glue the edges with quick-drying acetone cement.

If you have done the job neatly, the new cone should fit snugly just inside the tapered portion of the original cone and continue outwards in the same line. The underside should just clear nicely the metal edge of the assembly.

If the cone is not just right, it is only a few moments work to make a new one.

Constructional cross-section.

Moisten the rear inside edge of the new cone with acetone cement and attach it to the original paper cone, adding more acetone cement, if necessary. When dry, the new cone can be trimmed with sharp scissors to the same diameter as the housing.

Modified in this way, the cone area of the unit is greatly increased, and the rear damping becomes a less important factor in its operation. The two screws mentioned earlier can be removed, but they are now much less important in their effect on the quality.

Speech is still very crisp and clear, but it gains just the amount of "roundness" necessary to make for pleasant listening.

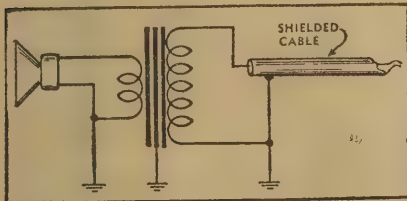
For convenience, the unit will need to be mounted in a new case, and it is suggested that this be made entirely of perforated metal to allow a free movement of sound waves past the diaphragm.

## MOUNTING

The case illustrated in the photograph was made from a scrap of perforated steel—zinc would be easier to work—rolled into a cylinder of diameter  $2\frac{1}{2}$  inches and length two inches. The joint at the bottom is lapped and soldered, and a circle of the same material can be soldered in place to form the back of the case.

The front is an ordinary push-in tin lid, with the centre cut out and a grille of perforated metal soldered to it.

(Continued on Page 79).

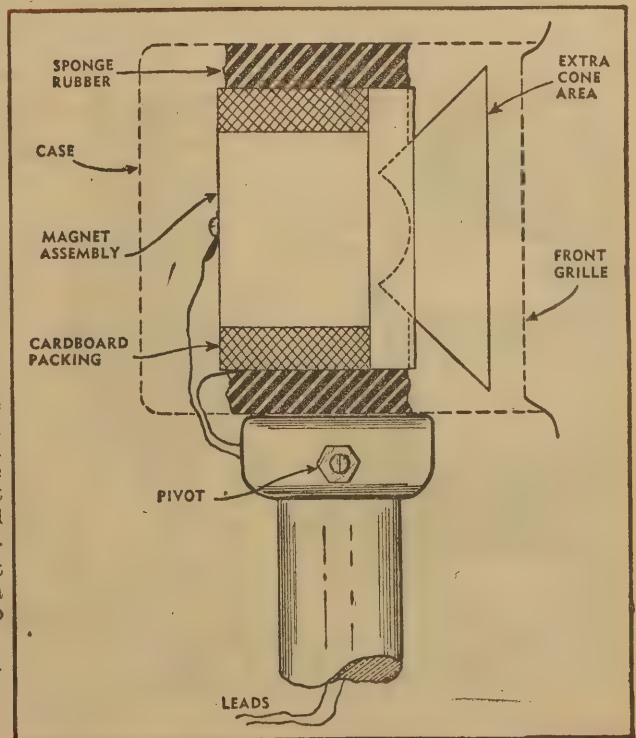


Connections for the microphone.

remarks. It was found by experiment that by far the best results were obtained by removing the unit altogether from its bakelite case and increasing the active area of the cone. The operation is quite a simple one.

## EXTRA CONE

Obtain a scrap of notepaper, light but stiff, and cut from it a circle, approximately three inches in diameter. Cut about a  $\frac{1}{4}$  in. circle from the centre, snip one side of the re-





# FROM THE SERVICEMAN WHO TELLS

While tidiness of wiring beneath a chassis is not, in itself, a criterion of electrical efficiency, it is nevertheless an item worth considering. And I feel that, in making repairs, a serviceman should not hang components underneath a chassis in a way which has all the appearance of the proverbial bird's nest.

**M**Y remarks about neatness are prompted by a receiver which I had to service during the month. It was a commercial 4/5 dual-wave receiver, wired in typical factory style. The important leads were run point-to-point, but the remainder of the leads and the parts were run parallel to the edges of the chassis, giving an air of tidiness and efficiency.

## ELECTROLYTICS

The chassis had originally been equipped with can-type electrolytic condensers, and these, after the manner of their kind, had given up the ghost. There had also been some trouble apparently with the paper bypass condensers, because the bypass on the high tension line and the one on the RF screens had been replaced.

I had no quarrel whatever with what the previous serviceman had done to rectify these troubles. The electrolytic condensers had both been replaced with 600-volt types and the new bypass condensers were likewise of 600-volt rating. Lower voltage condensers would probably have done, but our predecessor had taken no chances of the trouble repeating itself.

Perhaps it was just as well, because this set is in a home well away from service facilities, actually on a farm-cum-orchard on the outer fringe of the suburbs. There is not much profit in running out to a place like this, and the very awkwardness of it all earns the serviceman a bad name if

the receiver should fail shortly after a service call.

However, that is by the way. My quarrel with this serviceman was that he had not even bothered to clip the pigtailed of the new condensers. The ends had merely been tinned and the condensers strung directly between appropriate circuit points—just hanging there like surplus oddments. They were safe enough while the set remained in the one home, but I hardly think that they would have withstood the vibration of a truck or rail journey, had the owner decided to shift the set.

It seems logical enough, if a manufacturer goes to the trouble to make his chassis neat and sturdy, that the serviceman should not compromise his efforts by haphazard additions.

Some may accuse me of being unduly fussy, but, before trying to correct the new fault in the receiver, I removed the four condensers in question, and tucked them neatly in place against the chassis. A few other wires, which had apparently been pushed aside, were also straightened up, and the underside of the chassis once again took on an ordered appearance.

## EARLY WIRING

Looking back, I can remember an interesting reaction which followed the introduction of the present dish type chassis. Back in the nineteen-twenties, all radio sets were built on the baseboard and panel style, and the

wiring was exposed each time one lifted the lid to reveal the "innards" of this new marvel of science.

Accordingly, manufacturers and constructors alike excelled in their efforts to achieve an impressive neatness in the wiring. All leads were of stiff busbar, with screw terminal anchor points. And every bend was an exact 90 degrees—no more and no less.

When the dish type chassis came into vogue, the wiring was hidden, and there was a tendency to dispense with neatness for the alleged efficiency of short leads. And no bird could, possibly, achieve the glorious disorder of a chassis with each lead running unswervingly from here to there.

In actual fact, the majority of leads in a set are not at all critical as regards length, so that the virtues of such wiring methods were much overstated.

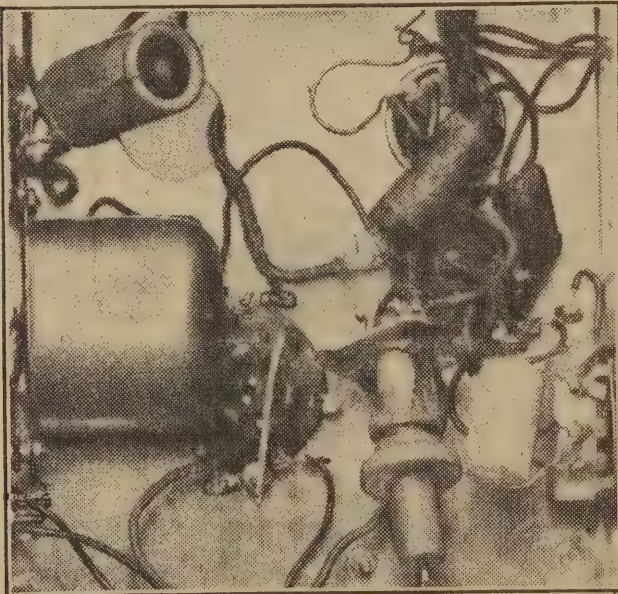
## IMPORTANT LEADS

Plate and grid leads in the tuner section of a receiver are quite important and every effort should be made in planning the layout to keep them as short and direct as possible. Long leads may upset alignment and produce instability by intercoupling effects.

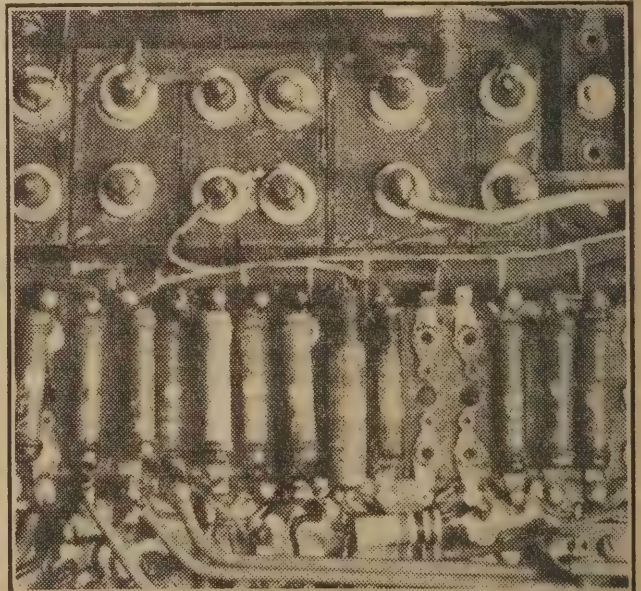
The B-plus, screen, cathode and AVC condensers should likewise be placed near to the points they are intended to serve. But the rest of the leads and the resistors are mainly d-c feed circuits, which can be of any reasonable length without the least danger of trouble.

## POWER LEADS

This means in practice, that heater wiring, B-plus and screen supply leads, AVC supply leads and so on,



A receiver wired in this manner cannot be expected to perform well. You are asking for trouble.



Careful layout of components both physically and electrically is the first step towards success.



can be installed in a chassis with an eye to neatness. Only the leads or wires which connect directly to grid, plate or diode pins, or the "hot" leads in the tuning circuit must be kept short. A chassis wired along these lines can be efficient, with the neat appearance of wires running parallel to the edge of the chassis, corded together perhaps, and small components mounted rigidly and neatly in place.

All this time I have said not a word about rectifying electrical faults in the particular set. But my remarks may, nevertheless, be helpful to some readers.

The receiver was inoperative when it reached me and a quick check with the voltmeter showed that there were no "ergs"—on the screen of the converter, and IF amplifier, and no oscillator plate voltage. Since the con-

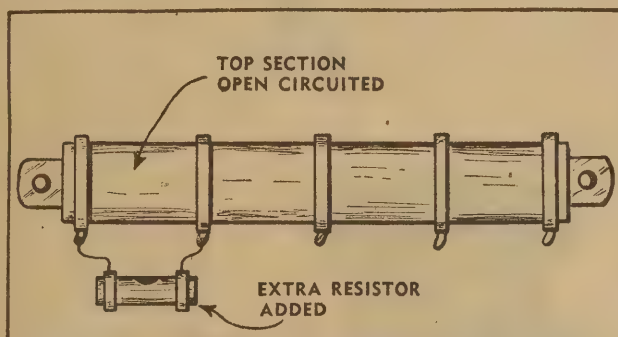
measured the resistance either side of it to the adjacentappings on the divider. The two values added up to about 2500 ohms. Allowing for a voltage drop of 50 across the section, the dissipation would obviously approximate one watt. So I wired a 2500 ohm, 3-watt resistor across the break and the set played again quite happily.

Leastwise, it seemed fair enough until I began to check the alignment. The owner had commissioned me to put it right at all costs, so that a check on alignment was the natural thing. Furthermore, he had complained about poor reception of the serials from a local B-class station.

### EARTHED COATING

The trouble now appeared to be a slight noise each time the chassis was bumped. While checking the grid

This diagram shows how the extra resistor was added as a repair to the voltage divider, one section of which had become open circuited.



densers were not at fault, there was obviously an open circuit in the voltage divider supplying these electrodes.

Voltage dividers have their good points, but they do cause a fair number of service calls. An inexperienced tester in a factory may drag a clip along the element without loosening the screw sufficiently, and score the fine wire badly before ever the set goes into commission. Sooner or later, you're gonna be comin' arou—sorry, that's the title of a song. Sooner or later the much mishandled wire gives up the unequal task and open circuits.

The alternative is to leave the clip too loose, the effect being aggravated if the divider is run sufficiently hot to cause charring or shrinkage in the cardboard former. The clip slips, the volts disappear, and with it goes the cost of yet another service call.

In this set—yes, we're getting round to it—the voltage divider was of a special composite design with a number of fixed clips and selected resistance values between them. The top section gave just the right number of volts for the oscillator anode. Then there was the screen tapping, and, bless the designer's heart, three other tappings for cathode bias, earth and back bias.

### OPEN CIRCUIT

The lower sections were wound with a different gauge of wire, so that the whole unit was one for which there could obviously be so simple replacement. But the top section was open circuited and it was up to me to do something about getting the set back into commission.

By judicious prodding with a needle, I located the vicinity of the break and

caps I noticed that the envelope of the converter was loose in the base and here was the source of the noise. It was a continental design, with metal-coated envelope and a contact wire encircling the envelope just above the junction with the base.

One cure, in such a case, is to strip a length of stranded hook-up wire, solder one end to the lead coming up from the base, and to wind the loose hookup several times around the envelope and in contact with the metal coating. Then bind around with adhesive tape to prevent further movement. There may be other ways of treating the trouble, but this method usually works out okay.

Having attended to this and checked the alignment, I up-ended the chassis on the bench and, with the set tuned to a local station without the aerial, I prodded each of the wires, joints and the small components with a bakelite lining tool to see whether I could spot any further sign of noisy operation. Last but not least the chassis was taken to my home and used for domestic listening for a couple of evenings.

### NEED FOR AERIAL

When the owner called, as per arrangement, to pick up the set, he mentioned quite casually, that he never used an aerial or earth. Why should he, he reasoned, when the set would still play stations without one? Leastwise, he had an aerial until the wind blew it down, and it had never been re-erected.

True enough, a sensitive set will play stations without an aerial or earth wire, but the signals arrive by devious paths, chief of which is the



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# MAXWELL COMMUNICATIONS

power line. And the same line alters its characteristic every time you switch on a light, and it may carry all the buzzes and crackles from switches and motors for streets around. So please use an aerial, mister, even if it is only tacked around the picture rail.

## ABOUT VALVES

When are valves not valves? When they are duds, of course. A puerile kind of remark, I know, but Formby can teach me a lot about humor. Besides, which I never have cleaned windows for a living!

Seriously, though, there is often a lot of doubt as to just when a radio valve can be referred to as a "dud." It may show up poorly in a valve tester, and yet operate well enough in a receiver. Every serviceman is familiar with this set of circumstances.

There is no doubt, of course, if the filament or heater is open-circuited, or if there is a short or open circuit in one or other of the electrodes. Yet again, the valve may be gassy, producing a blue glow and sparks, or just nothing at all.

But not every valve passes out that way. Many of them just work on and on till the emission drops to a fraction of its correct value. The condition is revealed in the valve tester, and the serviceman recommends and supplies a replacement. Later, the set owner may get out the old valve, plug it in the socket and tune in the local station. He concludes forthwith that the serviceman is a sharp character, and that the valve tester is a clever device to help sell more valves.

## EFFECT ON VOLTAGE

A receiver I handled last month had a broken down condenser, which was readily located and replaced. But a routine check of the circuit revealed that the high tension exceeded 300 volts, and that all other voltages were up in proportion.

Seeking the reason why, I found that the output valve read about 25 per cent. emission, and was drawing only a fraction of its normal current. This was allowing the voltage to rise appreciably. I had no hesitation in replacing this valve, for two reasons.

In the first place, an output valve handles a lot of current, and, once the emission begins to drop, the valve has just about reached the end of its useful life. Very soon distortion would have been painfully apparent, with perhaps a repeat service call and the thought that it was due somehow to negligent work on my part.

## OVERLOAD

Secondly, the abnormal voltage is applied to the other valves in the set and to the bypass condensers, subjecting them to needless overload. It could easily be the case of "the last straw. . . ." So I replaced the valve in question and explained to the set owner that the old valve was weak, that it could not last much longer, and that leaving it in the receiver would only endanger other components. In the light of my explanation the owner was happy to pay for the new valve.

Had the explanation not been made, he could have quite easily plugged in

(Continued on Page 81)





# A READER BUILT IT!

Gadgets and circuits which we have not actually tried out, but published for the general interest of beginners and experimenters.

## A HOME-MADE RECORDING HEAD

This month's contribution is well away from the subjects ordinarily featured in this page. Mr. E. R. Moffit, of 29 Wellesley-road, Pymble, NSW, tells how to construct a lateral cutting head for disc records.

Excellent results are claimed for this unit.

**S**O you want to make a recording head? This is probably the conclusion to which you have arrived after much foot-slogging in an effort to purchase a reasonably good one at a commonsense price. Cutters employed by professional recordists are worth their weight in gold, the main reason being that they are built with watch-maker's precision.

A problem which has always confronted sound engineers in the design of a cutting head is the pivoting of the armature. Some of the cheaper models employ the same principles as the standard magnetic pickup, i.e. a small rubber pivot, which also serves as a damping agent. Many of the more expensive types have specially balanced knife-edge pivots, with spring loading, and so on.

### SIMPLE DESIGN

The cutter about to be described has no elaborate pivoting, can be built up very easily, requires only two watts (the exact figure depending on the strength of the magnet used), and has a surprisingly good frequency range.

Now to work. The first job is to procure a suitable magnet which must be as strong as possible and of convenient dimensions. The magnet must be chosen first, for the shape of the pole pieces will depend on the magnet used. Having satisfied yourself in this respect, visit your local hardware store, and purchase a dozen good hacksaw blades, an assortment of files, a number 30 drill and a one-eighth tap (if you do not already boast the latter amongst your tools-of-trade).

### POLE PIECES

The pole-pieces are now made from a piece of mild-steel, and should be cut to fit snugly on to the magnet, allowing 3-16in. clearance between each other, top and bottom. After the slots for the coils have been filed out, drill and tap each pole piece top and bottom to take set screws, which will hold the coils in place. The pole-pieces should also be drilled and tapped at A and B, so that they can be screwed to a plate to hold them in position.

Next job is to make the coil formers. Two of these will be required, and the following dimensions should be strictly adhered to for best

results. Firstly, procure a piece of tubing (fibre or glass) of 1in. inside diameter, and cut off two pieces, each 5-16in. in length.

Next obtain four 5-8in. fibre washers, and file out the centre holes till they just fit tightly over the tubing. Then affix with a good strong cement. It is a good idea at this stage to pierce the fibre washers in two places with a tiny drill, so that the wires from the winding may be brought out.

### THE BOBBINS

We will wind our coils so that they will be suitable for use on a 500 ohm line, as it is now an easy matter to obtain a matching transformer with a 500 ohm secondary. Each coil will require 3000 turns of No. 37 B. and S. or No. 42 SWG enamelled copper wire; this is easily wound with the aid of a hand drill with a ratio of about 4-1. The exact number of turns is not critical, but it is important that both coils should be the same size, and have the same number of turns on each.

If you have succeeded so far, you should now be ready to tackle the job of filing out the armature, although it is quite realised that after making the pole-pieces, the would-be recordist never wishes to see another file.

The best type of iron to use in the armature is that found in an ordinary carriage bolt. By selecting a quarter-inch bolt of suitable length, a lot of time and trouble can be avoided. Firstly drill a 1-16th in. hole for about 1/4 in. centrally in the end, along the length. This is to accommodate the cutting stylus. Now drill and

tap across the end, so that a set-screw can be inserted to clamp the stylus. It is a good idea to file away any unnecessary metal, so as to lighten the armature. The set-screw on the armature should be about 1/4 in. below the bottom of the poles when in position, so this gives us the correct length.

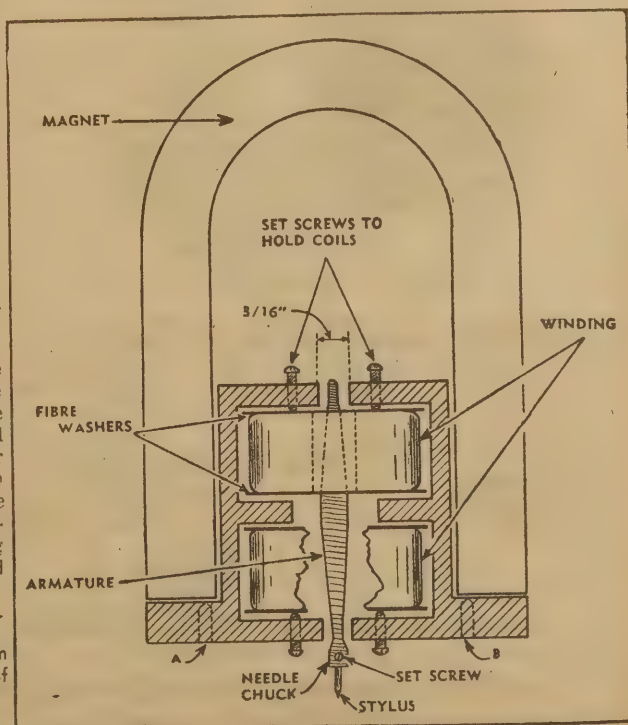
The shape into which the armature is to be filed can be seen in the diagram, and the only point to watch is that the armature must remain symmetrical, otherwise it will be thrown out of balance. It is left as flat as possible at the points, where it is attracted by the pole-pieces, and every few minutes when nearing the end of the filing process, it should be tried inside the coils.

### ARMATURE MOUNT

When it fits loosely inside the coils it is completed, and a piece of bicycle valve rubber should be carefully worked over the whole armature, excepting the chuck. Slight difficulty should now be experienced in pushing the coils on to the armature.

The coils and armature are now placed in position in the poles, which have been bolted on to a plate. With the magnet in place, the top and bottom coils should be juggled round until

(Continued on Page 79)



Cross section diagram showing construction of the cutting head.



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12V.	350	40 1/10/0
12V.	250	60 3/0/0
24V.	250	100 1/10/0
24V.	250	60 1/10/0
24V.	300	250 3/10/0
24V.	575	350 4/10/0

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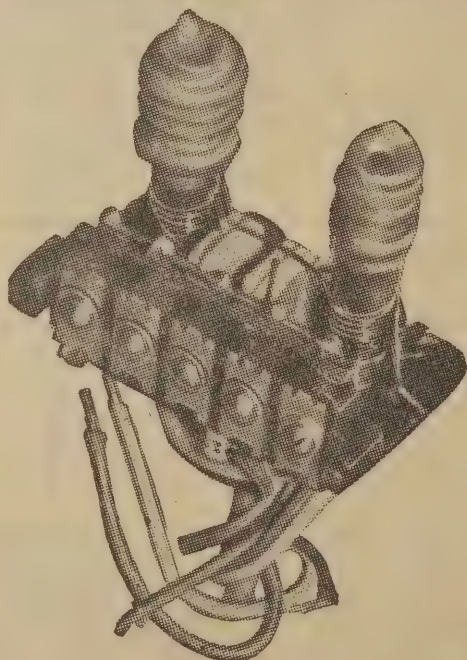
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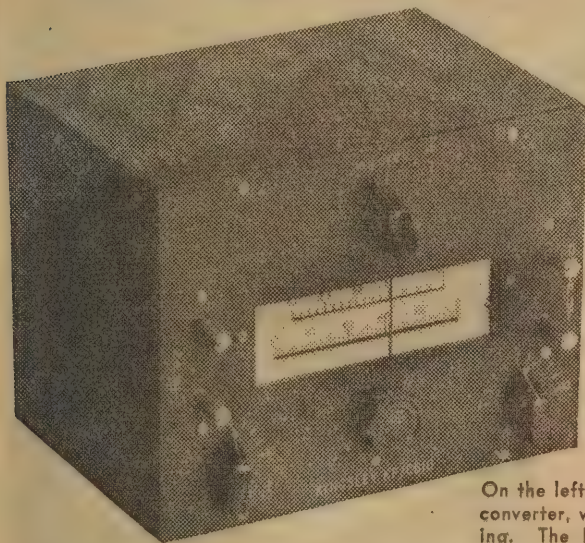
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# TRADE REVIEWS AND RELEASES

## FOR AMATEUR STATIONS

Two new releases by Kingsley Radio Pty. Ltd. will be of special interest to radio amateurs. One is the K/S9'er, a preamplifier and aerial matching unit, and the other is a 30-50 Mc. converter.



The K/S9'er consists essentially, of a radio frequency amplifier stage which incorporates a broad band tuned input and output circuit, together with an impedance matching system in both the input and output circuits.

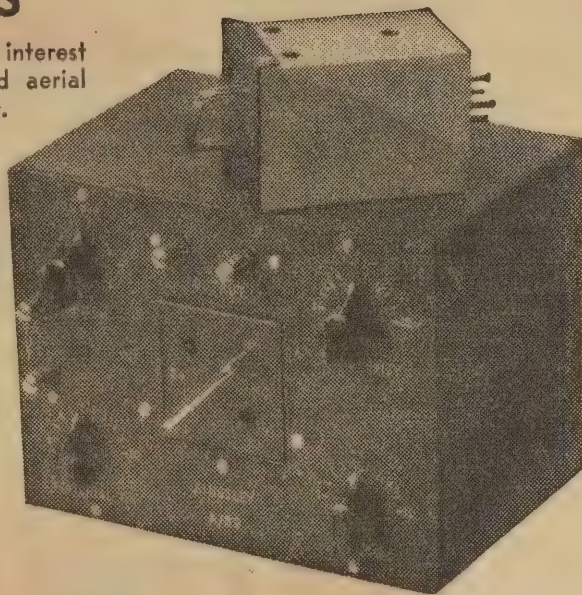
THE design originated when the necessity arose for a better impedance match between the antenna terminals of the short wave receiver and the aerial.

The unit is provided with two sets of coils in its most complete form, although only one set may be purchased as desired. Number one coil set tunes the 10 and 11 metre bands and number two, the 6 metre band. The coil sets contain the grid and plate tuned circuits. They are specially designed for band pass operation, the inductance being adjusted by an iron dust core. The capacities of the valve input and output circuit plus the stray capacities, form the resonant circuit.

Either a 6AK5 or 6AG5 is employed in the K/S9'er. The total current consumption of the whole unit does not exceed 15 milliamps at 250 volts and 3 amp at 6.3 volts and a cable is fitted for connection to the main receiver.

The controls on the front panel from left to right are:—Top left—on/off switch (this puts the antenna straight through to the receiver and opens the high tension circuit); And Top Right—screen voltage potentiometer. Bottom line—left, is the antenna matching control and right — the receiver input matching control. The coil unit plugs directly into a square opening in the centre front panel.

The frequency converter, type KF/



On the left is the new Kingsley 50 Mc. converter, which employs iron slug tuning. The K/S9'er on the right is intended for use ahead of communication type receivers, and is available for 50 and 30 Mc. operation.

C610 employs a 6AK5 as R.F. amplifier and an ECH35, frequency changer, and can be supplied on request for either 50 or 30 megacycle operation.

It has conventional input and output terminals, but also features the same aerial input matching device as the

K/S9'er. The output to the main receiver is at approximately 10Mc and control is available over the converter gain. Inductance tuning is employed for all three of the tuned circuits.

Power is obtained from the main receiver and an off-on switch is provided which breaks the power circuit and also diverts the aerial straight through to the main receiver.

Enquiries should be addressed to the Kingsley Radio Pty. Ltd., 380 St. Kilda Road, Melbourne SC 1.

## PLAYBACK NEEDLES FROM A.R.C.

IN a leaflet issued recently, the Australian Record Company stresses the need for using accurately shaped needles in the interests of record wear and fidelity of reproduction. Microphotos have revealed wide variations in shape and finish in gramophone needles commonly employed.

To meet the requirements of broadcasting stations, recording

weight of the pickup. Low mass steel needles are also available, and a low mass sapphire tipped stylus for special requirements.

The range includes no less than six types of standard sapphire tipped styli, three intended for radiogram use and three, with differing characteristics for transcription work. It is emphasised that, to obtain the best life from sap-



studios, theatres and record enthusiasts generally, the Company is now manufacturing a range of needles which are individually "shadowgraphed" to ensure uniformity of quality.

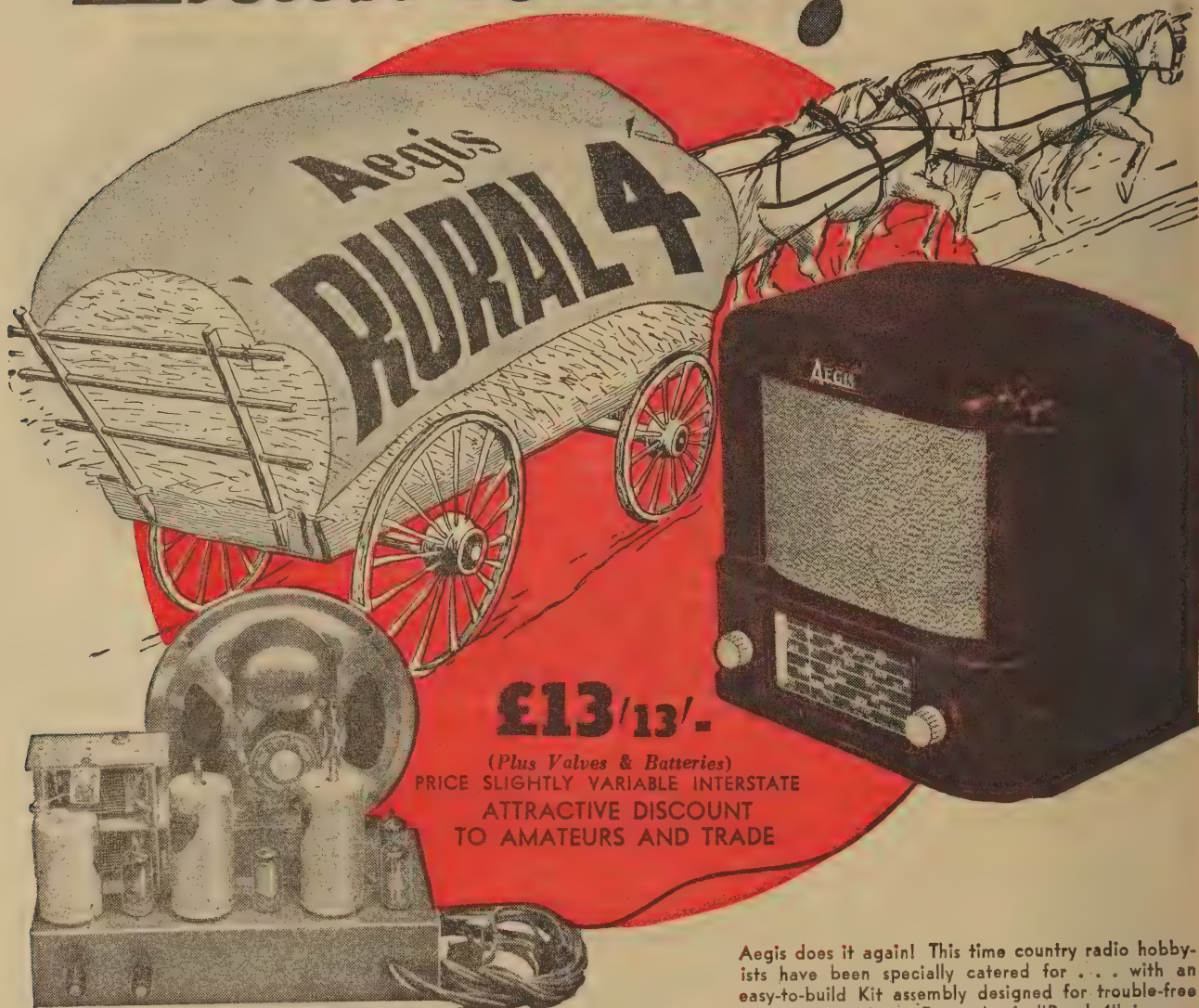
The standard ARC green shank shadowgraph needles are three times as hard as imported types, and will play from 4 to 8 ordinary discs, depending on the condition of the disc and the

phire needles, the weight at the needle point must be kept below 2 ounces, and they must not be used on cracked or jabbed records.

All these needles are manufactured locally, so that continuity of supplies is assured. For prices and full details, write to the Australian Record Company, 29 Bligh-street, Sydney.



# Listen to this!



**£13/13/-**

(Plus Valves & Batteries)  
PRICE SLIGHTLY VARIABLE INTERSTATE  
ATTRACTIVE DISCOUNT  
TO AMATEURS AND TRADE

## Features of the Rural Four

- Attractive mottled Bakelite cabinet.
- Button Valves for low drain with maximum gain—1S4, 1R5, 1T4, 3S4.
- "Aegis" Iron Core I.F.'s J9 and J10 specially designed for optimum gain.
- "Rola 6" Permag Anisotropic Speaker with Isocore Transformer—highly important for Battery Sets.
- Chassis and all metal brackets cadmium-plated.
- W.S.T. Switch Potentiometer.

**FREE!**

Write for 12 page illustrated  
Booklet on Circuits and  
Construction.

Aegis does it again! This time country radio hobbyists have been specially catered for . . . with an easy-to-build Kit assembly designed for trouble-free battery operation. Every Aegis "Rural 4" is complete from Valves to the last Nut and Bolt, together with full constructional details, all packed in sealed cartons with the "Aegis" symbol of satisfaction.

# AEGIS

**MANUFACTURING COMPANY** PTY LTD

208 LT. LONSDALE STREET,  
MELBOURNE, VICTORIA

DISTRIBUTORS IN ALL STATES.

VICTORIA:  
Replacement Parts Pty. Ltd.  
J. H. Magrath & Co.  
Lawrence & Hansen Elec. Pty. Ltd.  
John Martin Radio & Elec. Pty. Ltd.

N.S.W.:  
Geo. Brown Pty. Ltd.  
John Martin Pty. Ltd.  
QUEENSLAND:  
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S.A.:  
Healings Ltd.  
Harris, Scarfe Ltd.  
Newton, McLaren Ltd.

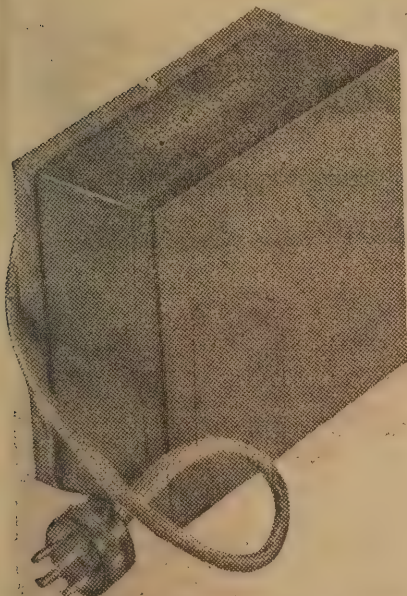
TAS.:  
Lawrence & Hansen Elec.  
Pty. Ltd., Launceston  
and Hobart.

W.A.:  
Nicholsons Ltd.  
Atkins (W.A.) Ltd.



## NEW VIBRATOR POWER PACK

Listeners in country areas will be interested in the release of the new Van Ruyten vibrator power packs. Compact in construction, these units are intended to replace the usual B-batteries, and input voltages range from 6 to 32 volts.



**TYPE VP690**, as illustrated, is built into a black crackle finished case measuring approximately 6in. x 5in. x 2in. It operates from an input of 6 volts and delivers an output of 250 volts at 15 millamps. The output is fully filtered and is delivered through a four-way shielded cable terminating in a 4-pin plug.

The full range of types is as follows:

**VP690.**—Input 6 volts, output 90 volts 15ma. suitable for 1.4 volt series.

**VP6150.**—Input 6 volts, output 150

volt 15ma. suitable for 2 volt battery series.

**VP6250.**—Input 6 volt, output 250 volts 45ma. car radio type, 6.3 heater series.

**VP12250.**—Input 12 volts, output 250 volts 45ma. car radio type English cars.

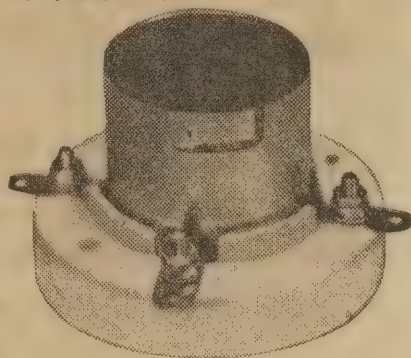
**VP32250.**—Input 32 volts, output 250 volts 45ma. 32 volts lighting plant. 6.3 volt series.

**VP6300.**—Input 6 volts, output 300 volts 120 ma. can be supplied for 12 volt operation for amplifiers (tentative only).

The units are available through normal trade channels, but wholesale enquiries can be addressed to Liebmann, Clarke Pty. Ltd., 370 Little Collins-st., Melbourne, C1.

## 50 WATT SOCKET

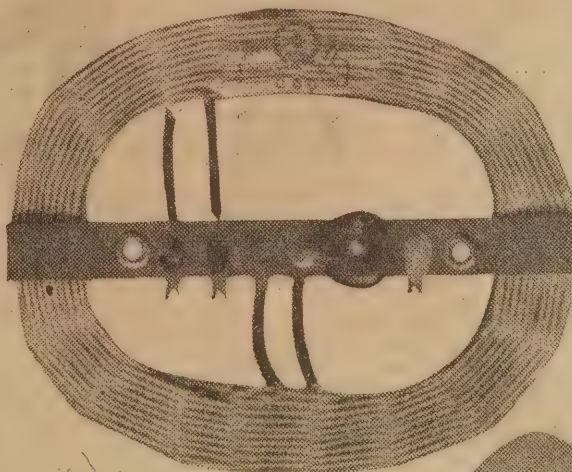
SUPPLIES of 50 watt transmitting sockets are now available from the Birnbach Radio Company, at 55 York-st., Sydney.



The sockets have a cast barrel, and a steatite base of best quality. Contacts are double-sided nickel silver and terminate as lugs for soldering purposes. Code number of the socket is 47/5U/5A and trade price is 17/7, including tax.

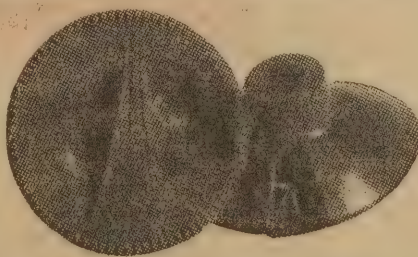
## Q-PLUS MIDGET COMPONENTS

Under the trade name of "Q-Plus," R. W. Steane & Co. Pty. Ltd. have released a line of midget components for use in personal portable receivers. Some of these new items are illustrated below.

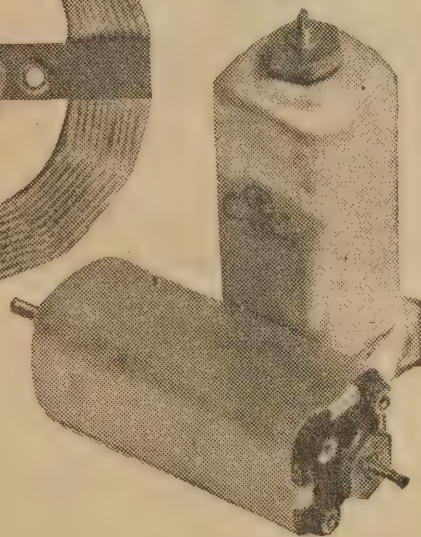


**THE** loop aerial, which is well suited to the "R.& H." "Handle Talkie," is fitted with a special loading coil to give even gain over the band. This can be used in conjunction with the Q-Plus midget oscillator coil, wound on the correct grid resistor for the 1R5 valve.

The knobs are of novel design, being intended to push into a recess in the cabinet front and thus give a flush mounting control. The knobs simply



The can of these midget I.F. transformers is coated inside with a heavy layer of wax impregnated with iron dust. This and a similar coating on the windings is said to offset partially the proximity of the aluminium can.



push onto the control spindle, being locked by a spring which engages a flat on the spindle. They have been moulded in a variety of pastel shades and in black and white.

The I.F. transformers measure only 1in. x 1in. x 1 7/8in. and give high gain at 455kc. The transformers feature single hole mounting, a moulded bakelite base and special iron dust impregnation. Alignment is by means of variable iron slugs.

These components are available through all distributors of Q-plus products.

## BOOK REVIEW

Moulded materials have always played an important part in the design of radio equipment, and the radio engineer must therefore have a good working knowledge of modern plastics—the materials available and their varying properties.

"Plastics For Electrical And Radio Engineers," by W. J. Tucker, is intended to give the essential information in handy but simplified form.

Chapter I deals briefly with the chemistry of plastics, and clearly defines what plastics are, and why they are good insulators. The plastic materials are tabulated and thoroughly analysed in Chapter II, and Chapter III explains the terms and definitions used throughout the book, giving data on standard tests and test conditions. Guidance in designing and manufacturing plastic products is given in Chapters IV, V and VI.

Chapter VII deals with the special but highly important application of plastic materials in the construction of transformers, coils, and many other radio and electrical components. Chapter VIII is devoted entirely to describing the application of plastic materials in the design and manufacture of sleeving, covered wire and cables.



# R.C.S. RADIO PTY. LTD.

174 Canterbury Rd.  
CANTERBURY

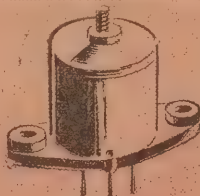
# COILS

FOR MANTLE ——— CONSOLE ——— PERSONAL RADIOS



## STANDARD INTERMEDIATE TRANSFORMERS

460 K.C. INTERMEDIATE TRANSFORMERS	
IF162 Intermediates 1st Stage Perm. Iron Core	13 9
IF163 Intermediates 2nd Stage Perm. Iron Core	13 9
IF164 Intermediates Low Gain Perm. Iron Core	13 9
175 K.C. INTERMEDIATE TRANSFORMERS	
IE74 175 K.C. Permeability Iron Core 1st	13 9
IE75 175 K.C. Permeability Iron Core 2nd	13 9



## MIDGET BROADCAST Coils

Dimensions 1" x 1"	
E352 Midget Magnasonic Iron Core permature Aerial Coil	6 6
E353 Midget Magnasonic Iron core permature R.F. Coil	6 6
E354 Midget Magnasonic Iron core permature Osc. Coil	6 6
E355 Midget Magnasonic Iron core permature Osc. 6SA7 valve	6 6



## STANDARD COILS Dimensions 1 1/2" SQ x 2" H.

SUPERHET COILS	
E342 Aerial Coils, H gang Air Core	6 6
E343 R.F. Coils, H gang Air Core	6 6
E344 Osc. Coils, H gang Air Core	6 6
E345 Aerial Coils, H gang Iron Core Permature	8 6
E346 R.F. Coils, H gang Iron Core Permature	8 6
E347 Osc. Coils, H gang Iron Core Permature	8 6
T.R.F. COILS	
T81 Reintartz Coils, H gang Air core	5 6
T87 R.F. with Reaction, H gang Air Core	6 6
T88 Aerial Coils, H gang Air Core	6 6
T89 R.F. Coils, H gang Air Core	6 6



## LOW LOSS COIL LACQUER KH34 2/6

A concentrated polystyrene lacquer for impregnating all components against humidity climatic changes, etc. Also invaluable for holding coil turns in place and anchoring ends of coil. An excellent seal for iron core screws and other similar purposes. Every radio engineer and amateur should have a bottle standing by.



## LOOP AERIAL COILS

Here is a positive technical advance upon ordinary loop aerial coils. The R.C.S. unit which is wound on a polystyrene spoked former has the aerial trimmer attached to the actual coil. This enables the aerial coil to be lined up after both the chassis and the loop aerial have been fitted into the cabinet. This, in effect, means that every R.C.S. Loop Aerial Coil can be individually lined up with the chassis with which it is used, a feature which must have a great benefit upon consistent performance.

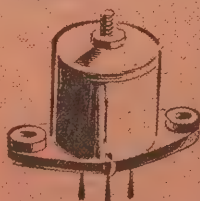
F125 Standard 6" diam.	7 6
F126 Standard 4" diam.	7 6

## COIL FORMERS, 6 PIN PLUG IN



These transparent coil formers are moulded from polystyrene powder. They are engraved for frequency and type and indented for color spotting. May also be grooved for space winding. Socket pins are heavily nickel plated.

## MIDGET SHORT WAVE COILS



HI21 S/W	13-42 metres, Iron core Aerial Coil	5 0
HI22 S/W	13-42 metres, Iron core R.F. Coil	5 0
HI23 S/W	13-42 metres, Iron core Osc. Coil	5 0



## "MAGNASONIC" INTERMEDIATE TRANSFORMERS dimensions 2" x 1" Rd.

IF168 Midget Iron Core Permature 1st	12 6
IF169 Midget Iron core Permature 2nd	12 6



## RADIO FREQUENCY CHOKES

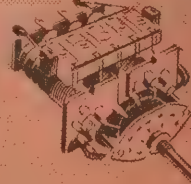
RF106 Vibrator Low Tension, R.F. Chokes	4 3
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RF81 Silk H.C. R.F. Chokes	1 9
RF85 Cotton H.C. R.F. Chokes	1 6



RF82 3 Pie 1.7 M/H R.F. Chokes	4 6
RF83 4 Pie 2.5 M/H R.F. Chokes	4 6
RF84 5 Pie 4.0 M/H R.F. Chokes	4 6
RF85 6 Pie 7.0 M/H R.F. Chokes	4 6



## DUAL WAVE UNITS

Type DW29—broadcast, short wave 31/-

R.C.S. RADIO PTY. LTD.

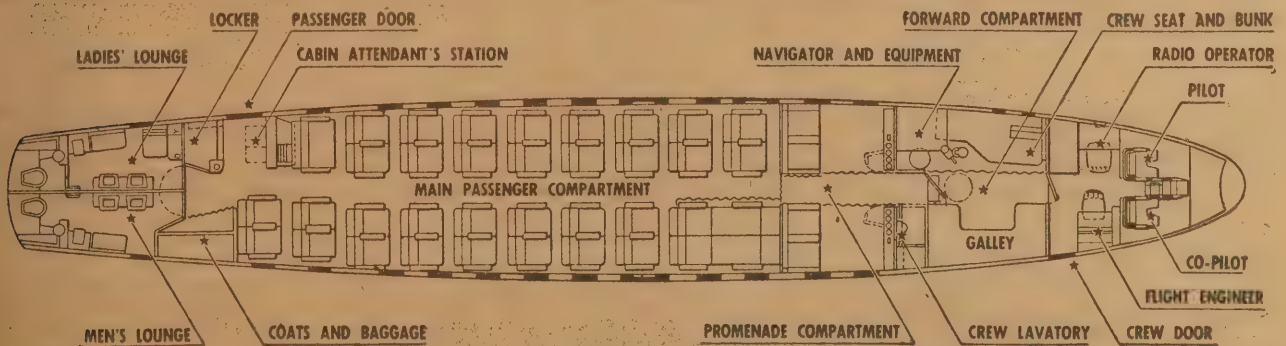
174 CANTERBURY ROAD, CANTERBURY, N.S.W., AUSTRALIA.



# KEY MEN FLY NEW CONSTELLATION



Crew members of a Lockheed Constellation are shown at their stations in this photograph of the interior of a Constellation cockpit which illustrates the importance of the flight engineer as the vital third member of a closely-knit flying team. Pilot and co-pilot as is customary, share all flight duties at their fully equipped stations in the nose of the ship. However, a special feature of the Constellation is the inclusion of a flight engineer (right foreground) with a completely equipped station as a regular crew member on every flight. The flight engineer, shown seated before the maze of dials and controls on his panel, controls the entire mechanical, hydraulic and electrical operation of the Constellation. Except for takeoff and landing, when the pilots take over engine operation, he handles all engine controls, observes fuel flow, continually checks the multitude of engine dials, and stands ready to check any condition that may develop before it can become critical. In addition, all hydraulic and electrical systems of the aeroplane are controlled through his switchboard with the exception of the radio. Operation of the cabin pressure control system and the heating or refrigerating of cabin air is another flight engineer responsibility. He records complete data as to the mechanical operation of the ship and makes a complete report at every ground station, guiding maintenance men to suspected trouble sources in a minimum amount of time. It is also his responsibility to supervise servicing, fuelling, loading and all ground handling of his ship at terminals and intermediate stops.



This plan-view shows the accommodation available in the new Constellation. The aircraft is excellently fitted, and the appointments are such as to provide every convenience in flight. Four of these aircraft are now in service for Quantas Airways.



# HELICOPTERS SHOW THEIR PACES



MCDONNELL AIRCRAFT CORPORATION'S XHJD-1

SIKORSKY S-51

Australia's first helicopter, an American-built Sikorsky S-51, was assembled recently at Laverton (Victoria) by RAAF technicians, and test-flown. Later, instruction in flying the wingless aircraft is to be given to other RAAF pilots.

**H**ELICOPTERS, designed to rise vertically and to have great stability in the air, can operate from extremely small areas—any open space as large as a tennis court.

The helicopter's "lift" comes not from the fixed wings of the conventional aeroplane but from a rotor (or rotors) consisting of long steel blades mounted above the fuselage.

The blades, which are inclined at a slight angle, like the sails of a windmill, are driven round by the motor. The pilot is able to adjust the pitch of the blades through special pitch-control mechanism so as to drive the machine forward through the air.

For many years aircraft designers have been seeking to design a machine able to rise and descend vertically, and to hover in the air. Most efforts failed to produce anything but cumbersome and impracticable contraptions.

Then in 1943 the first simple and practical helicopter appeared. It was

the work of Ivor Sikorsky, of the well-established American aircraft firm of Vought Sikorsky. He had been working on the problem for some years.

The design of Sikorsky's 1943 machine has undergone certain modifications in the light of experience, but all its main features remain. The standard model, the S-51, which is being adopted by other air forces, as well as Australian, is the latest development. It is sketched here in flight (lower left).

Lift and movement are both provided by the long-bladed rotor above the fuselage. This is mounted on top of the engine, which also drives a small rotor at the rear of the fuselage, set "side on," to overcome torque (or tendency of the whole aircraft to revolve in the opposite direction to that of the main rotor). The small rear rotor also provides directional control, since the pitch of its blades (and hence its "pull") can be altered by the pilot.

General flying control is maintained

by adjusting the pitch of the main rotor blades. This is achieved through special pitch-control mechanism.

The S-51 has sprung main landing wheels, set wide apart, and a castoring "nose" wheel.

The machine can fly backwards, forwards and sideways; rise or descend vertically, or hover at any level.

Since Sikorsky's first practical helicopter appeared, with its neat arrangement of a small rear rotor to overcome torque, many other designers have built machines with new features. Some of these machines have twin rotors mounted on arms and revolving in opposite directions, thus removing the problem of torque, and some using a jet-propulsion exhaust to counteract the reaction of the rotor.

An ambitious twin-motor helicopter—the world's first—has been constructed by the McDonnell Aircraft Corporation in collaboration with the United States Bureau of Aeronautics. Built as an experimental type for the US Navy, it has been given the designation XHJD-1.

The motors are each located in a nacelle mounted at the end of what is virtually an extremely short wing.

(Continued on Page 79)



# Gift Suggestions

*That are Sure to Please*

## PALEC MULTIMETER

The Palec "Minor" DC Multimeter is the ideal type instrument for the amateur and home constructor. It is housed in an attractive metal case, fitted with leather carrying handle. The ranges are: 0-2.5, 0-10, 0-50, 0-250, and 0-500 volts. 0-1, 0-10, 0-50, and 0-250 milliamps, 0-5000 and 0-50,000 ohms.

**£7/19/6**

## B.T.H. PICKUP

The BTH magnetic pick-up is not a new-comer but one that is well known for its fine performance and reliability. The whole unit is moulded from brown mottled bakelite. The curved arm ensures good tracking for records up to 12in. diameter. A volume control is incorporated.

**£2/15/0**

## "VIBRAPOWER"

The Ferguson "Vibrapower" unit is a compact self-contained vibrator power supply which operates from a 6-volt accumulator. It is housed in a steel case measuring 9 $\frac{1}{2}$ in. x 6in. x 4in. Two output circuits are provided. One is a filtered low tension 6-volt filament supply and the other is the normal HT supply.

**Input 6v at 0.95 Amps. Output 140v at 20 MA.**

Write to us for details on converting your battery receiver to "Vibrapower."

**£6/18/0**

## WESTINGHOUSE 815

Just arrived and only a limited quantity. This is a push pull beam power Amplifier suitable for operation up to 150 mc/s with 75 watts input on C.W. and with reduced ratings to 225 mc/s. The 815 is fitted with a standard octal base and top plate caps.

**£3/17/0**

## SOLDERING IRONS

An electric soldering iron is essential for the home builder—stocks of best quality type are now available. Nickel plated barrel with turned wood handle. For 240-volt operation.

**60 & 75**

**Watt**

**24/6**

**80 watt**

**Heavy Duty**

**28/6**

## DYNAMIC PHONES

High grade moving coil headphones, ex-Disposals, but brand new. The impedance of each ear piece is 45 ohms. They are supplied complete with adjustable headband, cord, and ear cushion pads.

**15/6**

## Magnetic Phone Sets

A very sensitive brand new Naval set consisting of balanced armature microphone and double head set. The microphone and each ear piece can be connected in series and without batteries a three-way telephone is possible. The children could use this set without the cost of battery renewals.

**25/.**

May we take this opportunity of wishing our many friends the Compliments of the Season, and trust that your wishes for those "hard to get" components will be fulfilled in 1948.

# PRICE'S RADIO

**5 & 6 ANGEL PLACE, SYDNEY**



# PICTURE NEWS OF THE WORLD'S SKYWAYS

## Unusual Jato

WHEN the Boeing XP-47 six jet bomber flies next month it will have available as supplement to its 22,000-pound turbojet thrust 18,000 pounds of thrust provided by the most unusual Jet Assistant Take off installation so far devised.

Eighteen 1000-pound thrust JATO units will be carried buried in the fuselage of the bomber with only their nozzles protruding.

The structure of the XP-47's fuselage is such that the JATO motors, weighing 200 pounds each, are lifted and mounted upon protruding brackets which are then withdrawn into fuselage wells.

As the JATO exhaust will be clear of the fuselage, no unusual installation will be required within the JATO wells.

Even at firing peak the JATO motor steel cartridge radiates no more than 660 degrees F. at its hottest area near the nozzle.

Because the XP-47 will be flown lightly loaded from the Boeing Field, Seattle, on its premiere, there is little probability that immediate use of the JATO installation will be necessary.

It will be available, firing in less than one second after a selector switch is thrown by the pilot, in event of an absorbed take-off or a landing wave-off requiring immediate surge of power.

In the bomber's first flight the latter will be the one more likely to be used should Boeing Field prove too short for safe landing and the bomber be required to fly to a nearby military field having longer runways.

## Constellation Flight

THE four Constellations now in Australia have already demonstrated their paces to interested observers.

During a first Press flight over Sydney, the machine reached 11,500 feet in altitude, its air-conditioned and pressurised cabin retaining the same characteristics as at 3000 feet. Despite an air temperature near zero, passengers were able to walk around with no consciousness of such a height which normally could cause distress from cold and low air pressure.

As a feature of long-distance flights, pressurisation should prove invaluable.

★ ★ ★  
ENGLAND claims the highest speed seat ejector with 500 miles per hour plus performance from a two-seater converted Gloster Meteor. The release was at 12,000 feet from a patent Martin Baker ejector seat.

## Super Speed

★ ★ ★  
THE US Army has granted a contract to the Douglas Aircraft Company for the design and building of an aircraft capable of flying at 2100 miles an hour and attaining heights of 200,000 to 300,000 feet (approximately 37 to 56 miles).

The aircraft will be a third in a series of machines designed for the surpassing of the speed of sound; the first the Bell XS-1 has made 25 test flights but has not yet reached the speed of sound. The second the XS-2 is still under construction.

The new plane will be called the XS-3.

## Seabees For Alaska

BEARING the black and orange colors of the Fish and Wildlife Service of the United States Department of the Interior, three Republic Seabee amphibians have been flown away from the Republic Farmingdale plant to Alaska for use in a versatile programme of game and fish preservation, protective law enforcement, wildlife surveys, game and bird census counts and predatory control.

The four-place, all-metal amphibians will be used over the tundra expanse of inland Alaska and also to patrol the 15,000 miles of Alaskan coastline, a sea coast mileage nearly twice as long as that of the entire Australian.

In inland operations the Seabees will be used from land bases, using the standard conventional landing gear in summer and skis in the winter.

For operations on coastal and offshore waters and Alaska's many rivers, they will simply retract their landing gear and then alight alongside any fishing law violator to inspect equipment, check the nature of catches and, when necessary, make arrests.

Each plane will carry two men and approximately 200 pounds of camping and emergency equipment, with full tanks of fuel.

A Seabee can cover 400 miles of fishing traps in a single day and take the place of at least 20 power-boats.

## Brabazon Progress

★ ★ ★  
THE 130-ton Bristol Brabazon was last month transferred to its specially-built assembly hangar at Filton, Bristol. Four are being built, one with Centaurus piston engines and three with Proteus turbojets.

The Saunders-Roe SR 45 flying-boat, which is about the same weight and size of the Brabazon 1, is expected to be ready to fly in the summer of 1950. Three have been ordered.

## Viceroy-Viscount

★ ★ ★  
VICKERS-ARMSTRONG LIMITED, taking note of change of political status of India and the British Raj, has renamed the "Viceroy," its four-engine turbojet transport, the "Viscount."

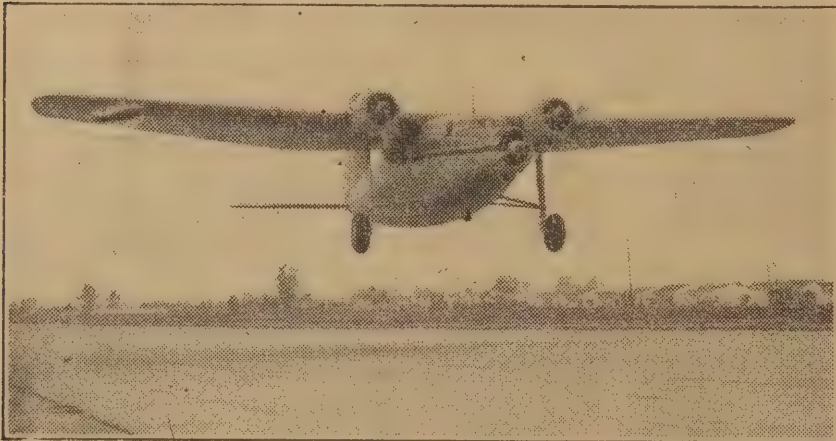
The aircraft, whose development is sponsored by the British Ministry of Supply, is intended to fulfil the Brabazon 11B specifications and ultimately replace the "Viking."

The selection of engines will depend largely on those the builder can supply.

Reports that Vickers-Armstrong have completed a design for a six-jet transport that should be flying by 1951 are too optimistic.

Such a project is under consideration, but further progress must be based on development work being done on the "Viscount."

## NEW 3-ENGINED PASSENGER PLANE



The Northrop Pioneer, new three-engine, 25,000-pound passenger-cargo transport, is shown here in flight after take off from Northrop Field on its maiden flight . . . Built by Northrop Aircraft at Hawthorne, California, home of the huge Flying Wing B-45 bombers, the Pioneer performed "highly satisfactorily and successfully," company officials said. The Pioneer, which can take-off with more than five tons of useful load in as little as 700 feet, was designed for airfields far too small for existing air transports. It is expected to help bring the air-age to the doorsteps of smaller US communities and the rugged interior of foreign countries of the world.



## Fast Trip

UNITED Airlines' non-stop Mainliner 300 (DC-6) flight of 6 hours 47 minutes 13 seconds from Long Beach, California, to New York City has now been officially accepted and recorded by the National Aeronautic Association as the West to East transcontinental record for commercial transports.

Examination by the United States Bureau of Standards of the barograph used to record the flight showed that the coast-to-coast dash was made at approximately room temperature—70 degrees Fahrenheit.

This was possible because of the Mainliner 300's new heat and humidity controls coupled with cabin pressurisation.

Thus the 38 passengers and crew of four rode in complete comfort although the plane flew most of the cross-country run at 19,000 feet.

The barograph was installed in the Mainliner 300's cabin and, when removed, enabled NAA officials to check the exact time of the flight, record temperature, and verify that the plane flew non-stop from Long Beach to New York.

★ ★ ★

## Silent Flight

NEWS from America states that an aircraft flying as low as 300 feet is as silent as a glider.

It has been developed and demonstrated at Langley Airfield by the National Advisory Committee of Aeronautics and embodies all known methods of noise suppression.

A major feature of the machine is its five-bladed airscrew, which rotates at a slower rate than the orthodox two or three-bladed airscrew and it is claimed reduces noise to a minimum.

★ ★ ★

## All-weather Fighter

THE United States Army Air Force recently revealed the first of a series of new all-weather fighters, the Curtiss XP87.

The 620 miles an hour, four-jet plane carries a crew of two and is designed to carry out combat interceptor or escort missions regardless of weather conditions.

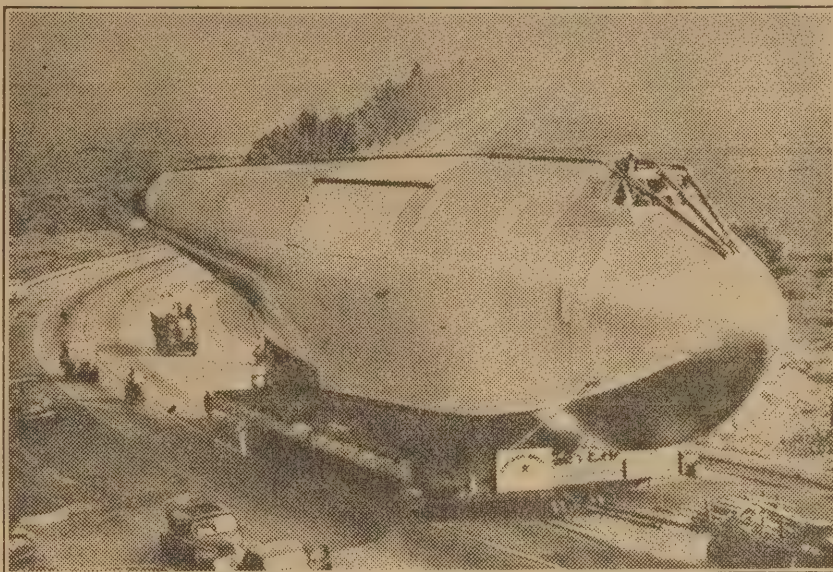
Incorporating a combination of special engineering features and radar navigational and fire control equipment, the 15-ton fighter may introduce new tactical planning factors into both offensive and defensive air combat.

Power is supplied by four Westinghouse 24C axial flow turbojet engines developing a total of 12,000 pounds static thrust.

It is capable of 620 miles per hour top speed, 585 at 20,000 feet, and has a rate of climb of more than 6000 feet carrying it up to its 40,000 feet ceiling.

The XP-37's armament is concentrated in the nose with six fixed .50 calibre machine-guns and a four-gun .50 calibre radar-controlled movable turret.

## HUGHES AGAIN IN NEWS



No picture of the Hughes Hercules shows its size better than this photograph taken during the journey from Culver City to the graving dock at Terminal Island, California, a distance of 28 miles. It has cost well over £5,000,000.

## Hughes' Anti-climax

THE answer to whether the Hughes flying-boat would ever fly was given by Hughes himself when he recently flew the machine for a short distance at about 100ft. altitude.

According to reports, the hull showed signs of the impact with surface waves, causing some to doubt as to whether it has sufficient strength.

Closely following the successful flight, US authorities announced that

they had no further use for the machine, which might therefore be disposed of, possibly without again taking the air.

No other machine has been the cause of so much controversy as this enormous eight-engined flying-boat. Whatever its future may be, valuable information should be available from its tests for use in determining the practicability of such enormous craft.

## Those Who Fly

APPROXIMATELY one-quarter of American air travellers are "first flyers" and almost one-third are women, according to sampling just completed by a prominent American airline company.

To get a cross section of present-day air travel, the airline for several weeks distributed questionnaire aboard its planes. The returns are as follows:—

Approximately 75 per cent. of those replying had flown before; 25 per cent. were making their first trips.

Approximately 75 per cent. were travelling on business or a combination of business and pleasure, while 23 per cent. were travelling solely for pleasure, and 2 per cent. for emergency reasons.

Of those replying, 70 per cent. were male and 30 per cent. female—and surprisingly, 16 per cent. of the women were on business trips.

In age, 79 per cent. were over 30, 48 per cent. were over 40, and 24 cent over 50 years.

As for incomes, 58 per cent. indicated their incomes were over 5000 dollars; 39 per cent. said their incomes were under 5000.

The company said the survey was conducted primarily to determine the

types of present-day traffic in considering various passenger service improvements. More than 1100 completed questionnaires were analysed in compiling the results.

★ ★ ★

## Miles Transport

MILES Aircraft Limited, of England, is constructing the prototype of its Merchantman, a four-engine, 20-passenger or 2-ton cargo craft, developed from its twin-engine all-wood "Aerovan."

The new all-metal Merchantman is powered by four Gipsy Queen 30 engines and can be converted to a two-ton cargo craft in approximately 10 minutes.

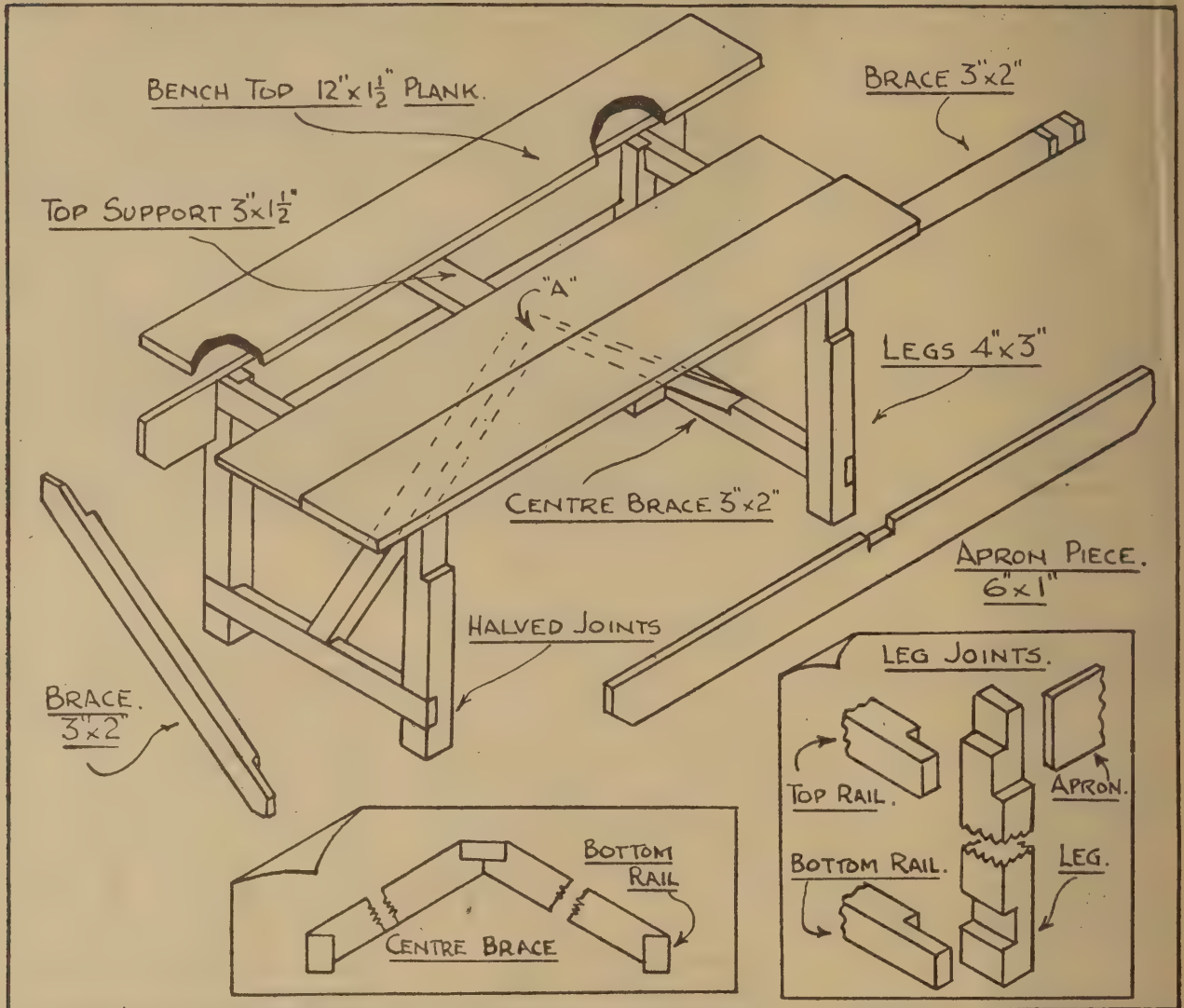
The Merchantman is a high wing monoplane with a single boom extending aft from the fuselage to support the empennage.

Fixed tricycle landing gear keeps reinforced cabin floor level when the plane is on the ground so that a short ramp is sufficient for loading through the wide rear doors.

The plane has a wing span of 66 and one-half feet, and overall length of 42 feet 9 inches and is capable of a cruising speed of 152 miles per hour at 2200 feet.



# A STRONG BENCH FOR YOUR WORKSHOP



A strong work bench is a necessary requirement for an efficient home workshop. At the outset be prepared to spend quite a few shillings on timber and many hours in its construction, but the money and effort will be worth while. A strong bench will last a lifetime, so the labor will be well spent. The timber list gives a fair idea of just how much material is required.

**M**OST of the joints are very intricate and will have to be carefully worked out to suit the stock to hand, for small variations in the timber sizes will make a lot of difference to the firmness of the finished job. It is necessary that care be exercised in making all of the joints a neat fit.

Commence with the 4in. x 3in. wood which is needed for the legs. Two feet 10 inches is required for each one, and take one piece and mark out this length, squaring the lines right round. Then, with the timber lying flat on the bench before you measure back 3in. and 6in. from the right-hand end, and 3in. and 3in. from the left-hand end. Note that the 6in. measurement is made right from the first squared line. Square the 6in. line across the face and the 3in. lines across one edge. Mark the other lines

to show the square of the depth cut. Set a marking gauge to lin. and mark the depth of the cuts to take the apron piece and the halved joints for the top and bottom leg rails. Carefully check the measurements and setting out, glancing at the sketch to get an idea of the completed joints. The leg thus marked out is meant to represent that one on the front left-hand side. It is necessary to remember this.

Now proceed to mark out the other

three legs from this master one. Thus all of the measurements will coincide. Note also that there is a relative position for each of the legs, so set them out in pairs to avoid mistakes. When you are sure that the markings and setting out is correct, cut the joints with a saw and a chisel. Keep all shoulders clean and square and the bottoms of checkings smooth.

Four rails are next needed, the bottom ones 3 feet long and the two top ones two inches shorter. All are of 3in. x 2in. timber. Mark out the halved joints for these and cut with a hand saw. Test the two assemblies and if the joints are correct the two end pieces should match. Glue and dowel or screw the separate assemblies together, making sure that they are square and level, then put aside for the glue to set.

## TIMBER LIST

Legs	4" x 3"	12 feet
Rails and Braces	3" x 2"	22 feet
Top Support	3" x 1 1/2"	3 feet
Bench Top	12" x 1 1/2"	14 feet
Filler Piece	12" x 3/4"	7 feet
Apron Piece	6" x 1"	14 feet



# MAKING A DYNAMIC MICROPHONE

(Continued from Page 63).

A "U" bracket is attached to the bottom of the case and arranged to pivot on the top of a short piece of brass tubing, in this instance about four inches long. This, in turn, was sweated to a conical base, actually a brass and rubber mount for the aerial rods of a military transceiver.

A circular wooden base, a pad of felt and a coat of grey duco completes a very neat assembly.

The microphone unit can be provided with a sponge rubber cushioning, which is made a push-fit into the cylindrical case.

First cut a strip of cardboard and wind it around the magnet shell until it is built up to the same diameter as the outer cone assembly ring. Bind it to the assembly ring with a couple of turns of adhesive tape. Now cut four small blocks of sponge rubber and fasten them to the unit with a couple of rubber bands. By watching the dimensions, it should be possible to make the whole assembly a snug push fit into the case.

Just before assembling it, however, attach the leads to the microphone unit and feed them down the rear of the case into the base of the stand. Push the unit well back into the case, fit the lid, and that part of the job is finished.

Most of these dynamic units have a voice coil impedance of about 45 ohms, so that a step-up transformer is desirable to feed into the grid circuit of the first amplifier valve.

A limited number of the transformers have been made available commercially, although a good quality carbon microphone transformer will serve the purpose passably well. Ordinary midget speaker transformers are not ideal, since they are almost invariably intended for a voice coil impedance of about 2 or 3 ohms.

If you can manage to remove the original voice coil winding, a satisfactory transformer will result if you replace the winding with one having about four times the number of turns of the heaviest wire you can fit into the available space.

If the transformer is of small size, it can be fitted to advantage in the base of the stand and a shielded lead run to the amplifier grid circuit. This plan was adopted in the microphone illustrated here.

The transformer should not be mounted on the same chassis as a power transformer, or even left to operate near a power transformer or choke, owing to the likelihood of hum pickup.

## HELICOPTERS SHOW THEIR PACES

(Continued from Page 74)

The rotors are mounted on "lattice-work" arms that sweep up from the engine nacelles.

Use of twin engines is intended to give the craft greater reliability in use over rough terrain, water and populated areas.

The main wheels are mounted on "legs" leading down from the wings just inside the engine nacelles. A tail wheel is fitted.

The XHJD-1 has a cruising speed of 100 miles an hour, with a load of 1½ tons.

Wingless aircraft are proving useful in the combined operations of military, naval and air forces, covering such tasks as army liaison and communication work, observation, rescue and ambulance duty.

Other fields of activity where their special characteristics can be of particular value are in air-sea, rescue work and in evacuating the sick or injured from otherwise inaccessible areas.

It is visualised that many types of work can be undertaken by the helicopter. As the aircraft "marks time," an engineer could step out and adjust the light on a defective buoy. On rescue work, a winch may be lowered to haul stranded airmen to safety. As a bridge-builder, the machine can hover over the site, using the power winch to raise or lower structural sections.

Most important role visualised for

helicopters, however, is that of everyman's aircraft." For the private owner the helicopter offers many attractive features, principal of which are that it is economical to maintain, can be housed in a garage, and is not over-difficult to pilot.

## A Recording Head

(Continued from Page 67)

the armature is centred between top as well as bottom pole-pieces. The set screws should now be tightened to hold the coils in this position.

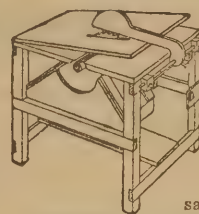
Upon moving the chuck from side to side it should be found reasonably firm; if not, it means that the armature was filed too much, or the rubber is not thick enough. On no account try to use rubber damping blocks between poles and armature, as this will upset balance and introduce distortion.

On the other hand, if everything checks correctly up to this point, connect the coils in series and apply about 250 volts a-c. If there is no movement, connect the other lead of one coil to make the series connection. There should now be slight visible movement, and this is the correct connection. An excellent idea for checking is to connect the coils the wrong way, and if the adjustment of the coils is correct, there is no movement in the armature whatsoever.

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## INSTRUMENT CASES

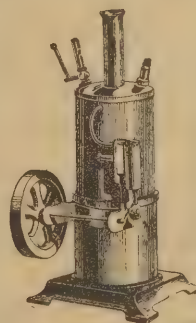
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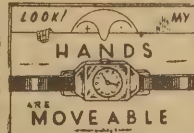
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TELEPHONE  
MA 2351



# MORE ABOUT RECORDING

(Continued from Page 59)

magnetic," or separately excited, the latter being clumsy, and involving heat dissipation problems, but, nevertheless, giving high sensitivity and superlative transient response. Heads using permagnetic fields have a better overload characteristic, because of the virtual impossibility of magnetic saturation being caused by the audio drive. Modern magnetic materials have caused the obsolescence of separately-excited heads

## DAMPING

Mechanical damping may be provided by a steel rod, welded to the moving assembly, and clamped at the opposite end under a movable plate, which allows centring adjustment. Auxiliary damping is provided by thermoplastics such as "viscaloid." Heads with viscaloid damping blocks can only be given a sine-wave test signal at full output for about five seconds, as the heat dissipated in the resistance of the windings causes a temperature rise in the head and may change the characteristics of the viscaloid.

The thermoplastic, incidentally, is cut into a definite strategic shape, and the trimming-down of certain specified areas with a razor-blade modifies the frequency response by shifting the various resonances higher or lower in frequency. This material is becoming obsolete now, as it is too touchy.

To give some idea of the audio power required to drive a typical head to the overload (or overcutting) region, one Australian-made head needs at least five watts peak power at 400 cycles to cause full-amplitude cutting. Another head has a full-drive power-rating of plus 16 DB, which is considerably below one watt. The discrepancy between the sensitivities of the two units is due to the magnetic efficiency, damping factor, and, possibly, the length of stylus from clamping-point to tip.

## MAGNETIC HEADS

Magnetic heads may be made to present any nominal impedance to the driving source. Typical values at 400 cycles are 8, 15, 200, 500, and 600 ohms. 600 ohms is the standard PMG line impedance in this country, and it is a convenient figure for equalisation of the head, if this function is carried out in the cutting-head circuit.

Crystal cutting heads, with perhaps a typical impedance of 100,000 ohms at 400 cycles, require entirely different driving sources and forms of equalisation. They are fed from special step-up output transformers, or from the plates of the output stage through a rather complex pad, suitably isolated from d-c potentials.

Crystal heads suffer from the common faults of piezo-electric instruments:—Susceptibility to extremes of temperature and humidity, and a fragility which forces engineers to handle them carefully. If they are given a

heavy overload, the crystal may fracture. Generally speaking, their frequency response and sensitivity is better than a magnetic head in a parallel price-class, but the disadvantages mentioned deter many engineers from accepting them in their present form.

Returning to the magnetic head—many heads are designed to give a 6 db/octave attenuation below some critical frequency, often 250 C.P.S. This means that, for a constant power below 250 C.P.S. fed to the head, the amplitude will not increase as the frequency decreases, which would normally occur. In other words, constant-amplitude below 250 cycles. This, of course, holds good only until the lower-frequency limit of the head is approached. In many cases this limit is about 50 C.P.S., but with semi-professional heads is more like 80, or even 100 C.P.S.

## HIGH PEAK

Most heads show a high frequency resonance-peak in their response, which cannot entirely be removed by damping, or other constructional features. It commonly falls in the band between 5000 and 8000 cycles. It is usually caused by the mechanical resonance of part or whole of the moving assembly.

It is not always necessary to subdue this peak by equalisation, as 6000 cycles is a practical upper limit for instantaneous recording. If a higher frequency were successfully recorded, it would probably be wiped off by the playback pickup on the first playing.

Apart from this, the frequency mentioned is one at which much deliberate treble-boosting is done, either in the amplifier or in the output circuit. This is to compensate for the effects of lineal velocity losses. The losses in the treble register are most aggressive in "acetate" recording, and a gently-rising frequency response to about 7000 cycles is not an unpleasant characteristic.

All cutting heads have to be calibrated, so that one can design an amplifier around them, to give a known frequency response when the recordings are played back with standard amplifiers, pickups, and loudspeakers.

Most convenient assumption is that one requires the overall frequency response of the system to be "flat."

## TEST FREQUENCIES

When one acquires a cutting head, its response may be anything but flat. But we will have a flat amplifier, and a flat or calibrated pickup on hand. So we can play a standard frequency-test recording with the pickup, through that amplifier, and re-record the various frequencies on the acetate blank. The test frequencies are often octaves, or multiples, of 16 cycles, up to about 6400 cycles.

Having recorded these, one can play the acetate back, and observe the reproduced levels at different frequencies. Now we are using the same amplifier and pickup, so discrepancies from the original levels must necessarily arise from the cutting head. One can then design an equaliser system to give the whole system the required response, which is never flat.

(To be continued)

# THE SERVICEMAN WHO TELLS

(Continued from Page 66)

the old output valve, heard it operate, and come to the wrong conclusion about my business methods. A little explanation of this nature takes time and trouble, but gives the right impression, and is an investment in goodwill for the future.

Many servicemen make a policy of smashing doubtful valves, with the knowledge and permission of the owner, to demonstrate that they have no ideas of reselling the old valve to some other client.

In the same receiver, the IF amplifier valve was also weak, testing at about 50 per cent. In most cases, a weak IF amplifier valve is only likely to show up as reduced sensitivity on distant or short-wave reception. For local stations, the AVC sets the gain back so far that low emission in one or other of the tuner valves is not likely to make any audible difference to the output. Nor does it have any appreciable effect on the high tension voltage.

## WEAK VALVES

Seeing that the owner was not a DX fan, I carefully pointed out the second weak valve and explained that

it could be replaced at the first financial opportunity. I have no doubt that the sale will come my way, and, in the meantime, the goodwill earned by the gesture may be repaid by recommendations from this well-satisfied client.

Converter valves are likely to be tricky when they become at all weak. At some point in their failing life, they will simply cease to operate and the receiver will go dead, either completely or over portions of the band. I remember one set with a weak converter valve, which the owner had kept playing by clicking the wave-change switch or bumping the cabinet each time the receiver stopped. To judge by the violence of his demonstration, it is a wonder that the chassis had not fallen apart before I was called in.

But the point is that every set has a different design of oscillator coil, so that a converter may just fail to oscillate in one set, but yet operate well enough in another. In the case of a converter, it makes all the difference between a set which will operate or will not.



# SHORT WAVE NOTES BY RAY SIMPSON

## IMPROVED RECEPTION ON BANDS 16 AND 13 METRES GOOD

Over the last few weeks night reception has improved to a great extent, more especially on the higher frequencies. Both the 13 and 16 metre bands now reach excellent entertainment level until around midnight and in fact can be heard well right through the night if one cares to have an all night sitting at the dials.

Coincident with the improvement in these higher frequencies there has been a noticeable falling off with the stations around 4800kc. and lower in frequency.

We consider the 25-metre band to be one of the most consistent at the present time as it can be relied on to give out good signals both in the early morning, afternoon and also at night. Our own favorite band, however, has always been the 31-metre outlets as we have had some of our best catches around those frequencies.

Readers may have wondered why we have not made any mention of the higher frequencies around 40 and 50mc, as promised in one of our issues a few months ago. The fact of the matter is we have not yet made up a receiver which will tune to these frequencies and have had no reports from any other readers of their loggings around this portion of the spectrum.

### OUR DX CONTEST

No doubt many readers are now anxiously watching the postman in the hope that he will bring along a big pile of verifications to swell their total for the contest. We only hope that other listeners have been more fortunate lately than we have been, as at time of writing only four verifications

have arrived during the past four weeks, while in past months we have had anything up to 25 or so. It is always a gamble to a certain extent and provided you have sent in a good report, everyone stands the same chance of receiving a reply except with those stations which only appear to answer every 50th letter or so. Best of luck to everyone, however, and may no one be too disappointed.

### ENGLISH S.W. LISTENER

This month we were very pleased to receive a nice letter from an English reader of "Radio and Hobbies." Our friend from the Old Country is Mr. Harold F. Buggins, of Woodstock, Oxford, and he sent us details of H12T which at the time of his writing he had not seen mentioned in our notes. Mr. Buggins also told us about PZE5 on 5843kc. which he is hearing at very good strength daily from 8.0 am when they use a series of chimes and give all announcements in Dutch. Unfortunately we cannot hear this station out here as the time and frequency are not suitable. We will be pleased to hear from you again, Mr. Buggins, and any other of our English readers who care to write to us.

## NEW STATIONS LOGGED

**TRINIDAD.**—Readers will have already read quite an amount concerning the new Trinidad station VP4RD located in the capital Port of Spain and the writer has been looking out for it for some time now both on 9625kc. and 9630kc., both of which frequencies had been reported from the USA as alternative channels to be used. However, it was eventually found on still another, namely, 9645kc., jammed in between GVZ and CR7BJ. When first heard it was broadcasting a commentary on a cricket match between Trinidad and British Guiana, this being around 7 am Sydney time. At 7.30 am a lady announcer took over and announced musical numbers until 8 am, when a male announcer was clearly heard to give the announcement, "This is Radio Trinidad in Port of Spain, British West Indies." On a Monday morning this station gives a church service, "Christ for the Nation," similar to that heard from KJEB on 9390kc. on a Sunday night. On another morning descriptions of horse races were heard and details of a fete to be held in some local institute. Short advertising items are usually given just before station announcement on the hour, and an interesting point is that call letters are not used, just "Radio Trinidad." Strength is not good and it is rather hard to tune in but careful tuning should do the trick. Watch out for this station on 6085kc. as they are also assigned to this frequency.

**PHILIPPINES.**—In last month's issue readers will remember we noted the Manila station KZFM was now operating on 9515kc. on short-wave and it was heard here for quite some time at fairly good strength. Shortly afterwards, however, it made a complete change and moved up to 11,800kc. in the 25-metre band where it was heard at much better level and free from interference. For some reason, however, it was not satisfied as at time of writing it has made a further change and is now on 11,900kc., right underneath KWID, which, of course, blots it out until 9.30 pm and even then it suffers interference from CE1190, which then opens on 11,900kc. Their new channel is a very poor one, so perhaps before these lines are read they will have made a further change.

**MALAYA.**—As we stated in the October issue, the British Far Eastern Broadcasting Service were to take a new frequency into operation some time in October. This proved to be so as they have now begun transmitting on 21,720kc. and they are using it for the Purple Network from 6 pm till 8.30 pm in place of the 9690kc. channel. According to advice we received direct from the station, they are also using 21,720kc. from Singapore at 3.30 pm till 4.30 pm, but we have not heard it at this time at our location. George Major, from WA, also reports hearing Singapore on this new channel. At 7 pm a news session is given which comes in at very good strength and this is followed at 7.10 pm by a share market report.

**CEYLON.**—Radio SEAC in Colombo have now made a change in their frequency in the 16-metre band, having moved from 17,770kc. to 17,820kc. According to the latest information, this 17,820kc. outlet is used from 1.30 pm till 10.35 pm, but we have heard it on later than this on some occasions and always at quite good strength. This new channel seems to be more free from interference than the old one and as long as CKNC does not decide to use it at the same time, we can expect to hear some good reception during the next few weeks. Radio SEAC has now used about 10 frequencies in the various bands and maybe one or two others now discontinued.

## HAVE YOU VERIFIED THESE STATIONS?

THE verifications listed below have been received by the followings—readers.,

Mr. J. Jensen: VLA5-6-9, VLB8, VLC9, VLG6, VLQ3, VLR.

Mr. M. Krumbeck: XGOA 9730kc, XTPA, FZI 17,530kc, HER5 11,860kc, VLA7, PCJ 9590kc, WLKS 6065kc, KRHO 17,800kc, WRNE, WOOV.

Mr. H. Fitzsimmons: HER5, PCJ, KWID. Master P. Kayser: VHL5, VLA5-6-7-8, VLB10, VLB9, KZRH, KCBF, KNBI, KNBA, KGBA, KNBX, KWID, KGEI, KCBR, CKLS, CHOL, WVTR, JKC, KZPI.

Mr. W. A. Gardiner: Johannesburg 4895kc, SUX, Singapore 6770kc, PLY, Andorra, CE622, CE1173, CE1180, CE1168, COBZ, COBL, CSW 11,090kc, FZI 9440kc, HP5K, CKRA, CBRX, WLKS, TAP, TGWA 9670kc, CXA19, Sofia 7650kc, 9315kc, ZAA, KZFI, HE12, SBP Busto Arsizio 9630kc, 11,810kc, Saigon 6190kc, FKE, CNR 9036kc, Madagascar 6065kc, VKC, Suva 6170kc.

Mr. H. R. Cox: LRM, Singapore 6770kc, 11,735kc, WVV 10 and 15 meg., AFN 6080kc, WRUS/A, CKOS, CHOL, CKCX, KGEI 15,130kc, 15,210kc, KGEX 11,730kc, 17,880kc, XGOA 11,835kc, 15,350kc, CBLX.

Mr. E. Moore: HS8PD, VUM2, CNR3, SEAC 17,770kc, Capetown 5880kc.

Mr. Rex Gillett: XGOA 15,350kc, 11,830kc, SEAC 15,230kc, XTPA, XMAG, KZPI 9500kc, KZOK 9690kc, Saigon 6165kc, CR7AB 3490kc, VUM2 9590kc, Tangier, Capetown 5880kc, Macao 9248kc, NW Deutscher Rundfunk, Jo'burg 9870kc, Brussels 21,450kc.

Mr. G. D. Gilbert: ZL3.

Master R. Rooke: VLR2, VLB, VLC7, WLKS, KZRH.

Mr. T. R. Boyd: KWID 11,900kc.

Mr. F. J. Smedley: HEU5, XGOA 9730kc, 15,350kc, PCJ 9590kc, CE1190, VLA7, HEU6, Singapore 9690kc, 6770kc, 11,735kc, 15,300kc.

Mr. R. Block: HCJB 9958kc, 12,455kc, TAP, CR7IB, XEWW 9500kc, AFN 6080kc, VUC2 7210kc, Ashard al Adna, 6135kc, BXE, WOOV 11,810kc, XGOY 11,913kc, HEU6.

Mr. A. Lee: PCJ.

Mr. H. F. Buggins (England): CXA10, ZPA5, COBZ, Dakar.

Our Own Listening Post WLKS 6065kc, Ashard al Adna 11,720kc, H12T 7275kc, 11,900kc, HEU5 11,815kc, NW Deutscher Rundfunk, FZI 7000kc, 17,845kc.

**S**HORT Wave Notes for the January issue are due on November 28. For the February issue they are due in January 9. Please send them direct to Mr. Ray Simpson, 80 Wilga Street, Concord West, N. S. W.

### Readers' Reports

THE following readers have sent in reports during the past month giving details of their reception on the various bands: Mr. G. D. Gilbert, Burwood, NSW; Mr. P. S. Lang, Croydon, Vic.; Mr. Rex G. Gillett, Prospect, SA; Mr. E. Moore, New Farm, Qld.; Mr. H. R. Cox, Cobden, NZ; Mr. W. A. Gardiner, Christchurch, NZ; Master P. Kayser, West End, Qld.; Mr. H. Fitzsimmons, North Fitzroy, Vic.; Mr. Max Krumbeck, Carlton, NSW; Mr. G. A. E. Major, Manjimup, WA; Mr. N. Harper, Emu Plat, Vic.; Mr. J. Jensen, Bankstown, NSW; Mr. Graham Hutchins, Melbourne, Vic.; Mr. R. E. Burns, Allenby Gardens, SA; Mr. A. R. Pettiford, Ashfield, NSW; Mr. T. R. Boyd, Regent, Vic.; Master R. Rooke, Manly, NSW; Mr. F. J. Smedley, Landsborough, Qld.; Mr. A. Lee, Merewether, NSW; Mr. J. Stenhouse, Dunedin, NZ; Mr. R. Block, Petersham, NSW; Mr. H. F. Buggins, Woodstock, Oxford, England.

### NEW STATION LOGGINGS

Call	KC.	Metres	Location	Time heard.
VP4RD	9645	31.10	Port of Spain, Trinidad	7.30 am
KZFM	11800	25.42	Manila, Philippine Is.	8.00 pm
KZFM	11900	25.21	Manila, Philippine Is.	9.30 pm
SEAC	17820	16.84	Colombo, Ceylon	9.00 pm
Singapore	21720	13.81	Singapore, Malaya	7.00 pm



## FLASHES FROM EVERYWHERE

**SWITZERLAND.** The Swiss stations are always well heard in this country, and listeners will therefore be interested to hear of some new channels which have been allotted to the Swiss Broadcasting Corporation. The new outlets are HEU2 9520kc., HEU3 9665kc., HEU4 11718kc., HEU5 11815kc., HEU6 15315kc., HEU8 17775kc., and HEU9 21705kc. Two of these, HEU5 and HEU6 have already been heard in this country and some of the others will no doubt soon also be logged. The United Nations, Radio Geneva, are reported to be making tests on the following frequencies, 9515kc., 9545kc., 9595kc., 9655kc., 11715kc., and 17770kc. All these channels are rather crowded, so they will be hard to hear, we think.

**FERNANDO PO.** From various sources we learn of a new super powered station which is to be constructed on this island which is located off the West Coast of Africa. It will be known as Radio Atlantic, but will not be in operation for about another 15 months. The transmitter will be located at Mosula, 40 miles west of the capital city, Santa Isabel, and the programmes will be beamed to Europe, Africa, USA, SA, and will be in Spanish, English, Portuguese, Italian, and French. Frequencies have not yet been assigned, but the station will operate in the 13 and 17-metre bands, according to "Radio News." As the power is to be 200kw., we should certainly hear it when it does take the air.

**HAITI.** Stations in this country are not heard very frequently in Australia and so far we have had no reports of the new one, HHCN, which took the air a short time ago. According to "Radio News," this station opened on July 15 on 5660kc., with a daily schedule of 8 am till noon with a power of 100 watts. Announcements are made in French, Spanish, and English, and according to Mr. Etienne, of the station, they will verify all correct reports of reception. Unfortunately the low power of 100 watts plus the particular frequency they are using just now makes its reception very difficult in this country at any time from 8 am onwards. If they later decide to operate at around 10 pm to 11 pm our time, we may be able to log them.

**MEXICO.** From Mr. R. E. Burns, of South Australia, we have the very interesting news that he has heard the Chapultepec stations XDY on 9925kc. and XDA on 14525kc. at the unusual time of 6 am Eastern Australian Time. At this time these stations were trying to contact London, and after giving their call frequently, musical items were given. They closed at about 6.30 pm, and at the time of writing had not been heard again. The normal time to log these stations is from just before 1 am until about 1.15 am, but at that time there is no English used, which makes identification more difficult for those who cannot understand the Spanish announcements. Keep a look out for these stations, as they may again be heard around 6 pm.

**DENMARK.** Rex Gillett raises a query as to whether a station he heard recently on a Sunday night was OZH2. It was heard on 15320kc. right underneath VLO4 at around 2 am. When VLO4 closed at 2.15 am, the reception of the mystery station was much improved, but beyond confirming the fact that the language used was Scandinavian, positive identification was not possible. Just before 2.30 am an interval signal of about 14 notes was heard, followed by a church service. When Rex stopped listening at 3.30 am, the station was still on the air. All things considered, we think this must have been CZH2 and we now look forward to any further reports from other listeners who may have heard it recently.

**CHINA.** Stations in this country are amongst the most difficult to identify, and what confuses the issue still more is the habit they have of changing frequency without notice. The following is a list of some of the stations that are supposed to be operating: XUPB 8348kc. Amoy, XTPA 11560kc. Canton, KUPA 10000kc. Foochow, XOPB 9652kc. Hankow, XLRA 11495kc. Hankow, XPPA 6400kc. Kunming, XGOE 9868kc. Kweilin, XPPA 9430kc. Kweiyang, XPMRA 9750kc. Lanchow, XRRRA 10260kc. Peking, XKPB 9500kc. Taiyuan, XGAS 11680 kc. Kung Chin. There are quite a few more, one of which we have heard on 6060kc. announcing as XNCR, but we believe this is really XGHT relaying the programmes from XNCR. Some day we may have complete lists and be able to list them all correctly.

## FORCES BROADCASTING STATION RADIO SEAC CEYLON

**THIS** well-known station is now being heard at very good strength in this country, and we think many listeners will be interested to have some details of the station's transmitters and general policy. We are indebted to the "Forces Radio Times," which published these details for its listeners in the many parts of Asia where it can now be heard.

Radio SEAC first came on the air as experimental station ZOJ in October, 1944, radiating for only a few hours each day from a borrowed transmitter and from borrowed studio space. In March, 1945, a 7½kw. transmitter beamed eastward from Ceylon opened and the station's name became SEAC. Broadcasting hours were increased to 9½ per day. During this time, however, a bigger station was being planned and the first experimental transmissions with the 100kw. unit were made in April, 1946. On the first day of May the new schedule started, including 16½ hours a day on the two transmitters—the new 100kw. unit and the original 7½kw. RCA transmitter.

### THREE UNITS

The broadcasting system of Radio SEAC now consists of three main units, the receiving station at Horahena, the studio centre in Colombo, and the transmitting site at New Ekala. All are situated on the western side of Ceylon and the transmitting site is particularly suitable as the island is surrounded in all, except the northerly direction, by vast oceans.

The station, when planned, was intended specifically to provide a good signal over the area included in the South-East Asia Command, and in addition, has facilities for beaming transmissions to Australia and New Zealand, and to the United Kingdom.

At the present time the antenna systems in daily operation are beamed on India, 350 degrees N of W, and Japan 36 degrees E of N, and the Pacific 80 degrees E of N and once a week on Sunday evening in Ceylon, the United Kingdom beam is brought into operation on a bearing of 322 degrees N of W, which array can also be used on its reciprocal for Australia and New Zealand.

The receiving station at Horahena is equipped with two banks of RCA AR88 receivers which are used in triple diversity to receive programmes from the United Kingdom and Radio Australia. In all cases rhombic antenna are used and are fed to the receivers via wide band RF amplifiers and the usual line switching and monitoring facilities are provided. The audio output from the receivers is fed to the studio control room and thence to the transmitting site by overhead telephone lines.

### TRANSMITTERS

The transmitter building houses one 100 kw. Marconi SWB-18 transmitter and the two operational RCA ET-4750 7½kw. units. In addition, one small 1kw. transmitter is also in operation and it is hoped that another 7½kw. transmitter of a similar type will be available in the near future. "Even so, these transmitters do not allow us to take full advantage of all the facilities available in the shape of antenna systems," comments the chief engineer, "but do, however, provide general coverage over South-East Asia."

The 100kw. transmitter is normally directed on Burma and Japan, but has an antenna system which is designed to provide a wide beam of approximately 70 degrees. The two RCA transmitters are normally operational on the India beam on 49 metres and the Pacific beam on 16 metres. From this it will be appreciated that though the operational frequencies are not always optimum, under favorable conditions a good signal should be maintained for the greater part of the day throughout India, Burma, Malaya, the near Pacific and Japan.

The Studio Centre is equipped to provide live transmission or recorded programmes, and any compromise between the two.

Radio SEAC's suite of studios is located at 191 Turret-road, opposite the Town Hall, in Colombo.

Listeners to Radio SEAC who at any time find themselves passing through or stationed in Colombo, are most welcome to visit the station and be conducted over the premises.

The station, originally a SACSEA Unit, is now operating under the control of the Director of Army Welfare Services, the War Office (AWSS), London. The station director, Wing-Commander A. E. Smith, is responsible to the Director of AWSS for the detailed running of the station, and the station's adherence to the policy laid down. A committee representing all three services, Army, Navy and Air Force, meets periodically in Singapore to review the activities of Radio SEAC and to co-ordinate points raised by the various areas served.

Broadcast policy of Radio SEAC is "entertainment plus news, and a link with home."

### MAIL

Average mail from listeners is 8000 letters per month, most of them being naturally for requests. Officials say "the closest attention is paid to complaints (which, happily, are few) and all suggestions received. Reception reports arrive from all parts of the world. Sweden oddly enough sends most from Europe, and all are acknowledged. We modestly cannot think why, but there are regular listeners to Radio SEAC, incidentally, in every city in the USA."

Broadcast time allocated to each request programme is in direct proportion to the volume of requests of each kind received. At present, in a week, there are 55 hours of popular music, 16 hours of classical, and seven hours of swing and jazz. These figures represent the proportion of requests.

There are no full-time announcers at Radio SEAC. All of the 20 or 30 voices heard over the microphone belong to people who do other work in scripting, producing, play adaptation, programme compiling, and so on.

The frequencies at present allotted for Radio SEAC are 3395kc., 6075kc., 9520kc., 11770kc., 15120kc., 15230kc., 17770kc., 17820 kc., and 21620kc., most of which are at present in use.

In connection with radio broadcasting in Ceylon, we might mention that there is another separate outlet in Colombo, with the call of ZOJ, "The Ceylon Broadcasting Station" operating on 4900kc. While this station is listed as only using 7½kw., and is intended only for local coverage, it is often picked up at quite fair strength in other parts of the world.

## ZJA6 BRITISH GUIANA

### 15085kc 'CRICKET' STATION

**IN** last month's issue readers will remember we mentioned hearing a station in the West Indies broadcasting descriptions of a cricket match around 7 am Sydney time. At that time we were unable to identify the station but are now pleased to be able to give its call letters and location. It is ZJA6, located in Georgetown, British Guiana, and operated by Cable and Wireless (WI) Ltd.

This station was particularly pleased to receive our report and as it is of more than usual interest we show below a copy of our verification which we have just received by air mail.

Cable and Wireless (WI) Ltd.,

Georgetown,  
British Guiana,  
Dear Mr. Simpson,

First let me thank you very much indeed for your very much appreciated and welcome report on our ZJA6.

Your log tallies exactly with mine and there is no doubt that it was us that you were hearing. I must say though that I am very surprised that you should hear us

at all as ZJA6 is directed on Jamaica, a dipole aerial being specially cut for it. On investigation I find that you are particularly at right angles to our transmission path.

For the broadcast we were using an SWB8 which has a power output of approximately 2kw. We also had a report from a ship not far from the UK (my home) and except for a little QRN she was getting us quite well. I must say these reports are very, very encouraging indeed and I must thank you once again for same.

By the way, this is the first report from Australia that we have had.

If I can ever assist you in any way I should be only too glad to do so as I can assure you you have done me a great service.

Good-bye, and thank you very much.

All the very best,

A. T. Fox, Engineer, Georgetown.

As readers will see from the above, it is not only sw listeners that can become enthusiastic, as when station engineers receive reports which are of use to them they are really very appreciative and almost without exception send along a nice card or letter of verification.



# 4 outstanding

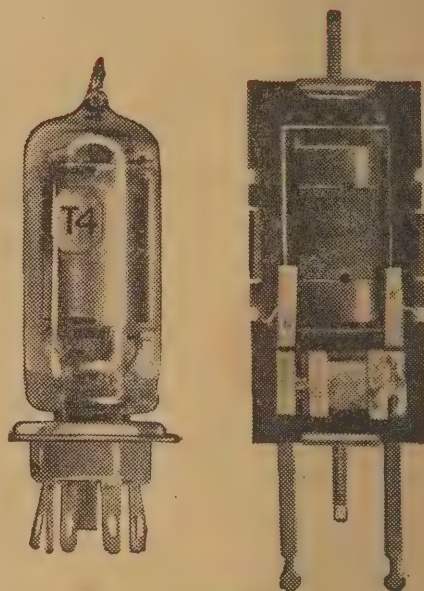
Each of these products is typical of Kingsley's "get ahead" attitude; each one is, beyond doubt, the most advanced of its kind, specially designed for component function in personal portable receivers.

Watch for announcement of the release of the "Ferrotune" Personal Walkie-Talkie Kit to be available shortly.

## Miniature I. F.s

1

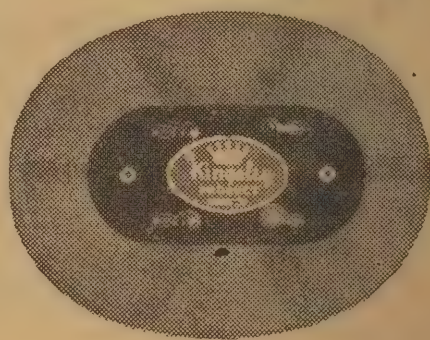
Giant in performance—dwarf in size—Kingsley types KIF14 and KIF15 are the result of thorough laboratory research and rigorous testing. One of these miniature I.F.s has been photographed alongside the new "peanut" valve-type 1T4. Kingsley miniature I.F.s give you the greatest GAIN in radio. Miniature coils are also available.



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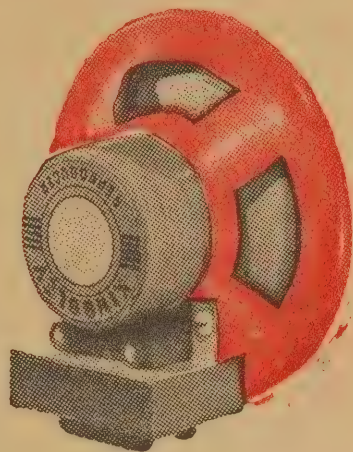
# *performers!*

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## **Miniature Speakers**

**3**

Take any larger speaker—visualise its accuracy and its splendid reproduction qualities, and then realise that this new Kingsley miniature gives you the same basic qualities. This speaker is a masterpiece of reproducer design. Radio engineers are unanimous in their praise of its technical superiority.



## **Miniature "Ferrotune" Unit**

**4**

To complete the Big Four of modern miniature radio, Kingsley advances the KF/JB "Ferrotune" Unit. Every radio enthusiast knows the outstanding qualities of "Ferrotune." Now you can incorporate it in your personal portable!



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LTD.**

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# NORTH AMERICA'S ON 13 & 16M

## SUPPLEMENT TO HANDBOOK

THE following list of North American stations operating in the 13 and 16-metre bands will supplement the other continents shown in Call Book.

17750 WRUA Boston, Mass., USA.  
 17750 WRUL Boston, Mass., USA.  
 17750 WRUS Boston, Mass., USA.  
 17750 WRUW Boston, Mass., USA.  
 17750 WRUX Boston, Mass., USA.  
 17760 KWID San Francisco, Cal., USA.  
 17760 KWIX San Francisco, Cal., USA.  
 17770 KNBI Dixon, Cal., USA.  
 17770 KNBA Dixon, Cal., USA.  
 17770 KCBR Los Angeles, Cal., USA.  
 17770 KWIX San Francisco, Cal., USA.  
 17780 WBOS Boston, Mass., USA.  
 17780 WNBI New York, NY, USA.  
 17780 WNRA New York, NY, USA.  
 17780 WNRE New York, NY, USA.  
 17780 WNRI New York, NY, USA.  
 17780 WRCA New York, NY, USA.  
 17780 KCBR Los Angeles, Cal., USA.  
 17780 KGEI Belmont, Cal., USA.  
 17780 KNBA Dixon, Cal., USA.  
 17780 KNBC Dixon, Cal., USA.  
 17780 KNBI Dixon, Cal., USA.  
 17780 KNCB Dixon, Cal., USA.  
 17800 WLWK Cincinnati, Ohio, USA.  
 17800 WLWL Cincinnati, Ohio, USA.  
 17800 WLWR Cincinnati, Ohio, USA.  
 17800 WLWS Cincinnati, Ohio, USA.  
 17820 CKNC Montreal, PQ, Canada.  
 17820 WCBN New York, NY, USA.  
 17830 WCBX New York, NY, USA.  
 17830 WCRC New York, NY, USA.  
 17850 KCBF Los Angeles, Cal., USA.  
 17850 KNBI Dixon, Cal., USA.  
 17880 WGEX Schenectady, NY, USA.  
 17880 KGEX Belmont, Cal., USA.  
 17955 WLWL Cincinnati, Ohio, USA.

18160 WNRA New York, NY, USA.  
 18160 WNRI New York, NY, USA.  
 21460 WRUA Boston, Mass., USA.  
 21460 WRUL Boston, Mass., USA.  
 21460 KCBA Los Angeles, Cal., USA.  
 21460 KNBA Dixon, Cal., USA.  
 21490 KGEI Belmont, Cal., USA.  
 21500 WGEA Schenectady, NY, USA.  
 21500 WOOC New York, NY, USA.  
 21500 WOOW New York, NY, USA.  
 21520 WCBN New York, NY, USA.  
 21520 WCBX New York, NY, USA.  
 21520 WCRC New York, NY, USA.  
 21520 KCBA Los Angeles, Cal., USA.  
 21520 KCBF Los Angeles, Cal., USA.  
 21540 WBOS Boston, Mass., USA.  
 21570 WCBN New York, NY, USA.  
 21570 WCBX New York, NY, USA.  
 21570 WCRC New York, NY, USA.  
 21570 KCBA Los Angeles, Cal., USA.  
 21570 KCBF Los Angeles, Cal., USA.  
 21590 WGEA Schenectady, NY, USA.  
 21610 WNRA New York, NY, USA.  
 21610 KWID San Francisco, Cal., USA.  
 21610 KWIX San Francisco, Cal., USA.  
 21630 WNBI New York, NY, USA.  
 21630 WNRA New York, NY, USA.  
 21630 WNRE New York, NY, USA.  
 21630 WNRI New York, NY, USA.  
 21630 WNRX New York, NY, USA.  
 21630 WRCA New York, NY, USA.  
 21630 KNBI Dixon, Cal., USA.  
 21630 KNCB Dixon, Cal., USA.  
 21650 WLWK Cincinnati, Ohio, USA.  
 21650 WLWL Cincinnati, Ohio, USA.  
 21650 WLWO Cincinnati, Ohio, USA.  
 21650 WLWR Cincinnati, Ohio, USA.  
 21650 WLWS Cincinnati, Ohio, USA.  
 21710 CHLA Montreal, PQ, Canada.  
 21730 WNRX New York, NY, USA.  
 21740 KCBF Los Angeles, Cal., USA.

## STATIONS IN JAVA

THANKS to the DX session from Radio Australia who received the information from Art Cushen, we publish the call signs, frequencies and operating times of some of the stations in Java.

### BATAVIA

YDB2 4910kc., YDB3 6366kc., YDB4 9680kc.  
 —Week days, 8.30 am—11.30 am, 1.30 pm—4.30 pm, 5.30 pm—1.30 am. Sundays, 8.30 am—4.30 pm, 5.30 pm—1.30 am.

YDD 2600kc., YDD2 4865kc., YDD3 9550kc.  
 —Week days, 8.30 am—10.30 am, 2.30 pm—5.15 pm, 7.30 pm—2 am. Sundays, 8.30 am—5.15 pm, 7.30 pm—2 am.

YDC 15,145kc., PLS 10,365kc.—Week days, 8.30 am—11.30 am, 1.30 pm—4.30 pm, 7.30 pm—11.30 pm, 12.30 am—2 am. Saturdays opens at 9.30 am.

PLO 11,440kc.—To N. America, 12.30 am—1 am.

PMW 17,630kc.—To N. America, 3 am—3.45 am.

PLA 18,600kc., PMA 19,345kc.—Week days, 2 am—3 am, Saturdays, 10 pm—11 pm.

### DJOKJAKARTA

YBJ2 2080kc., YBJ 5620kc.—Week days, 8.30 am—10 am, 2.30 pm—5.30 pm, 7.30 pm—1.30 am.

## Station Addresses

VUM.—The Station Director, All India Radio, Eastnook, Egmore, Madras, India.  
 CS2WI.—Radio Club Portugues, Parade, Portugal.

H12T.—La Vox del Yuna, Apartado 623, Ciudad Trujillo, Dominican Republic.  
 Kuala Lumpur.—Department of Broadcasting, Java-street, Kuala Lumpur, Malaya.

ZFY.—British Guiana United Broadcasting Co. Ltd., PO Box 272, Georgetown, British Guiana.

HOLA.—Radio Atlantico, Apartado 444, Colon, Panama.

YV1RW.—C/o Estacion Onda Larga YV1RW, Radio Coro, Coro, Venezuela.

COCK.—Estacion COCK, "Mil Diez," Renia 314, Havana, Cuba.

CPRE.—Radio Club de Malanje, UO Box 83, Malanje, Angola.

XECC.—Estacion XECC, 2 Norte No. 803, Puebla, Pue., Mexico.

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**VALVES**

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FREQUENCY RESPONSE: Linear within 0.2 db.  
20 cps. to 30,000 cps.

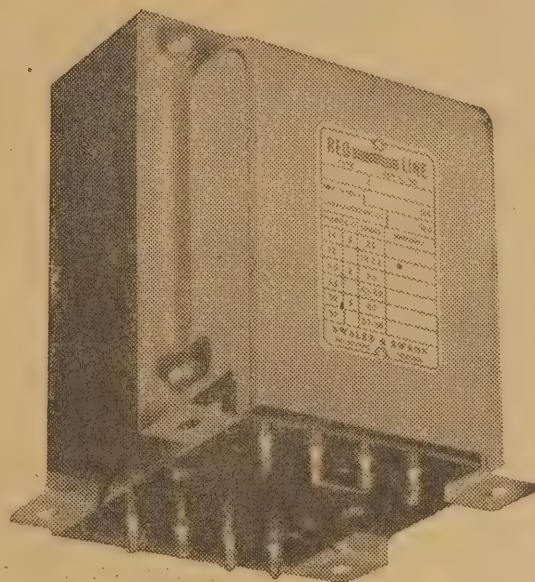
PRIMARY INDUCTANCE (at low ac flux) not less than  
125 Henries.

LEAKAGE INDUCTANCE: 17 Millihenries.

INSERTION LOSS: 0.4 Decibels.

This Transformer may be used to obtain a gain reduction of up to 25 db across 4 Stages in a suitable negative feedback circuit. ★

\* to Voice Coil if required.



TYPE No. AF10

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### ● POWER TRANSFORMER

10v, 210v, 230v, 250v, 50 cps. Sec. H.T. 500/500v at 175 ma.  
5v 3a. 6.3v.; 2a 6.3v. 3a

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★ as described by Mr. D. T. N. Williamson in "Wireless World," April and May, 1947.

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OF DEPENDABILITY



# THE HAM BANDS WITH BILL MOORE

## FREQUENCY CONVENTION ENDS

The set-up which dealt with amateur frequency allocations was quite a complex one. All deliberations have been completed. The allocation sub-committees were the first step; they sorted out the requirements of various sections of the radio spectrum.

**T**HE matter next went to the working group—5 experts without country, who made the final recommendations to main committee, comprising delegates of all the 77 nations participating.

As was anticipated very varied frequency channels are available to amateurs in different parts of the world. The globe has been divided into three zones for frequency allocation purposes. Differences do not stop there; as the respective Governments have the right to grant additional channels to their amateurs.

Generally speaking we in Australia have received better treatment than amateurs in Zone 1 which comprises Europe, Africa, Near East, Asiatic USSR and Mongolia; but lag behind the prospective grants to those in Zone 2—North and South America.

Our delegates as reported in QST fought hard to have our present band widths retained, but with little success with respect to the 14 and 7mc bands. They were especially opposed to any sharing within the 7mc band, but pressure from the major European Powers won the day.

The views of the nations were so varied and diverse it is a wonder any degree of conformity to past standards was attained.

The general outcome of the conference from our viewpoint is perhaps disappointing, but on reviewing the demands of other services and the opposition to amateur radio in some spheres, the final allocations must be received with some satisfaction.

Our total frequency allocations from 3.5mc. to 28mc., remain practically the same, made only possible by the granting of 450kc's at 21mc.

The latter band should provide a source of fine DX potentiality, a cross between our 28mc and 14mc allocations, allowing both day and night DX. We may hope it is a solution to the ever increasing W station QRM and unlike 20mc, it won't be open to the States for so many hours of the day.

As far as can be ascertained at this stage the following frequencies are available for amateur use in the three world zones:

### ZONE 1—EUROPE, AFRICA, NEAR EAST, ASIATIC USSR AND MONGOLIA.

7100-7150 kc's shared.  
7000-7100 kc's exclusively amateur.  
14,000-14,350 kc's exclusively amateur except 14,250-14,350 which will be shared with USSR fixed stations.

28,000-29,700 kc's exclusively amateur.  
144-146 mc's exclusively amateur.  
420-450 mc's shared.  
450-460 mc's shared.  
1215-1300 mc's exclusively amateur.  
2300-2450 mc's exclusively amateur.

### ZONE 2—NORTH AND SOUTH AMERICA.

3500-4000 kc's shared.  
7300-7300 kc's exclusively amateur.  
14,000-14,350 kc's exclusively amateur except 14,250-14,350 kc's shared with USSR fixed stations.  
21,000-21,450 kc's exclusively amateur.  
26,960-27,230 kc's shared with industrial and medical equipment.  
50 to 54 mc's, 144-148 mc's,  
220-225 mc's all exclusively amateur.  
420-450 mc's shared. 1215-1300 mc's and 2300-2450 mc's exclusively amateur.

### ZONE 3—ASIA AND OCEANIA.

3500-3900 kc's shared.  
7000-7100 kc's exclusively amateur.  
7100-7150 kc's shared.  
14,000-14,350 kc's exclusively amateur, except 14,250-14,350 kc's shared with USSR fixed stations.  
21,000-21,450 kc's exclusively amateur.  
26,960-27,230 kc's shared with industrial and medical equipment, granted in New Zealand and Australia only.  
28,000-29,700 kc's exclusively amateur.  
50 to 54 mc's exclusively amateur.  
144 to 148 mc's exclusively amateur.  
420 to 460 mc's shared.  
1215 to 1300 mc's and 2300 to 2450 mc's exclusively amateur.  
Australia of course being included in Zone 3, special allocations were as follow:  
7150 to 7300 kc's shared use in China and New Zealand.  
26,960 to 27,230 kc's shared in South Africa.  
50 to 54 mc's exclusive in South Africa.  
You will see from the above lists, that American amateurs receive the most liberal allocations while the British Dominions were next on the list.

## NEW ZEALAND MEMORIAL CONTEST

**J. WHITE, ZL2GX, NZART** contest manager, forwards news of an 80mx. contest to be run by the NZART during December.

The contest is the Memorial contest to perpetuate the memory of those ZL Hams who lost their lives during World War II.

Australian amateurs are especially invited to compete and a certificate will be awarded to the VK contestant contacting the greatest number of ZL's.

The contest will be run over two weekends, December 6 and 7 and 13 and 14. Six figure serial numbers are to be exchanged. The first three numbers to be retained by the station and the latter three, the first three figures received during the last contact. To the first number transmitted attach three zeros. Telephony or CW can be used.

The NZART would like your support and, we hope the QRM won't be too bad during December.

**T**HE 1947 VK DX contest was exceptionally well supported and from observation it would appear as if activity by stations reached an all-time high. Overseas publicity given to the contest was satisfactory and the appearance of the full rules in October QST greatly assisted in the contest's success.

It is far too early to give a concise review of station scores, but an approximation is available from many competitors. Most operators are still recovering from the ordeal and final logs have not been compiled.

In the telephony section VK6RU should be close in the running for the open event, while VK2DT has tried to retain the 28mc. section with some 18,000 points.

The CW section produced some incredible performances. A DX contact every 7½ minutes for the full duration of 96 hours

was VK2EO's effort. 750 contacts with a multiplier of 84 provides a score of 193,000. 59 countries were worked on 20mx., 19 on 10mx., 5 on 40mx., 3 on 27 mc., were the individual counts. In the second weekend Dave lost four hours—asleep over the key.

Outstanding station overseas was generally considered as XE1A, who worked on five bands—10, 11, 20, 40 and 80 metres.

In the 20mx. section three fine scores were produced in the Hunter Valley. Leader among them seems to be VK2DG with a score of 107,000, 450 and 76 countries; VK2ZC had 540 contacts in 61 countries, using a three-element rotary; VK2AHA, 555 contacts in 55 countries. These three stations will take some heading in the 14mc. section.

Some very fine work was done by VK2RA in working three countries on 80mx.; he contacted ZL's and XE1A and KP6AA. It is a number of years since such DX was worked on this band.

The 10mx. section in NSW finally developed into a contest between VK2JX and VK2HO. The former working 24 countries and 299 contacts and the latter 26 countries and 238 contacts. The final scores of these two stations are only separated by a hundred points and the results will depend on their treatment at the hands of the contest committee. In Grafton, VK2NY contacted 23 countries with 123 in this section also.

Other open scores included VK2ANN, 495 contacts, 63 multiplier, VK2RA 370 by 65, VK2QL 450 by 50, VK2YC 270 by 42, VK2ZH 170 by 31. All logs should be in the hands of the contest committee at Melbourne on November 14.

## 1947 W-VE DX CONTEST

**A**USTRALIAN winners of the above contest were announced by WGERH to VK2YC, first VK2EO, second VK2ANN, third VK2VA, fourth VK3HG, and fifth VK2YL. Full details appear in November QST.

## WIA NEWS

**O**PERATORS of WIA official stations on broadcasts, appreciate the action of amateurs in keeping off their frequency during transmissions. It is hoped in the future that special frequencies will be set aside for WIA official purposes.

VK2ARE, NSW traffic manager, is on schedule with WIA traffic each Monday and Friday at 1915 hrs. frequency, 7050kc's. He states that State traffic managers would appreciate it greatly if operators could keep clear of their schedules for a few minutes each evening.

The October meeting of the NSW division was well attended, considering the fact that many hams were resting before the DX test battle and didn't show up and that the whole meeting was to be devoted to business. The business paper, which filled most of the evening, saw much lively debate. The action of the Federal councillor VK2YC

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## BOYT'S

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in placing on record at the last Federal convention the fact that NSW was in favor of an all-embracing Federal constitution was endorsed.

This constitution would cover a Federal executive and all State divisions, the finance and general administration to be controlled by the Federal body. It was the feeling of the meeting that this action would be a very definite step toward a stronger and more progressive WIA.

Two members volunteered to run jointly the position of sub-editor of the magazine. They were to obtain technical articles and generally organise all matters pertaining to "Amateur Radio."

The finance committee reported that the division's financial position was satisfactory. A number of subscriptions were outstanding and would members give the matter their attention. The adoption of March as the end of the fiscal year would greatly assist in the collection of fees.

## THE UHF's

Each month brings further news of contacts between different continents on the 6mx. band.

On October 18 at 1100 hrs. EAST communication was established between J9AAO in Okinawa and CE1AH in Chile, a distance of 11,000 miles. Records are broken weekly but this effort just doubles previous distances.

J9AAO heard CE1AH and after paralleling a couple of beams broke through. A lot of further distant contacts have been reported but no details or confirmation is available as yet. Reported are a cross band QSO on 5 and 6mx. between an English and a Canadian station, contacts between W6 and J, cross band work between ZS on 6mx. and G's on 40mx., work between South America and California. The band is really opening up for international work and as the population increases so will the DX contacts.

In the US the possibility of a worked all States certificate for 6mx. during 1948 is being discussed. Over 18 stations have contacted 40 States or more and W9DWU is leading with a total of 45 States (only 3 more to contact). Here in Australia a number of Eastern stations only require Western Australia for all States and win the special trophy to be presented by the WIA. There has been little sporadic E work during the last month. VK4PG broke through to VK3 on a couple of occasions but only for a short period.

In Newcastle VK2BZ and 2ADT of Cessnock have been running schedules with ZS6JB and J9AAO with negative results to date.

2KQ of Toronto has newly arrived on 6mx. and 2VU of Singleton will shortly be on. The latter was very active on 5mx. prewar.

NSW has lost one of its stalwarts on 6mx. with the transfer of F/O Les Page, VK2YQ, to Ballarat. Operating from Schofields just west of Sydney he was the first station to work through to Newcastle. Victoria gains an active and enthusiastic UHF man.

The Gladesville Radio Club organised a 166mc. field day on November 2 with 3 mobile stations on the air. Results were very satisfactory. Stations were located at Kurrajong where 2NP and 2HL operated, Mount Kelra near Wollongong where 2AXB, 2AKB and 2ALU assisted and at Central Mangrove Mountain west of Gosford with 2AEX and 2ACB operating.

Communication was established between all Stations, besides working with Sydney and Blue Mountain amateurs. 5 element Yaesu Arravs were used and average power 4 watts. greatest distance covered 65 miles Kelra to Mangrove Mountain.

## WORLD TOUR

THE schooner Albatross of the Swedish Oceanographic survey will use ham radio for communication purposes. At the moment the Albatross is in the Pacific and will arrive in the N.E. Indies early in the year.

The call-sign to be used is SHFX and frequencies 7024, 14,350 and 28,420 kc's. In the winter of 1948 the ship will return to Europe via the Mediterranean. QSL's should be addressed Attention Radio Operator, Research Laboratory of Electronics, Gothenburg, Sweden.

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## F.M., NBFM AND PULSE TRANSMISSIONS

FOLLOWING the granting of permission to Australian amateurs to use F.M. and Pulse the Federal Executive recommends the following standards.

In an Editorial in "Amateur Radio" these standards were suggested.

Maximum modulation frequency 3500 cycles.

Peak deviation plus or minus 5000 cycles.

With reference to pulse the setting up of standards must be deferred until such time as privileges are extended to pulse modulation. The only requirement for pulse transmission for which stations are at present licenced is that the combination of pulse length and repetition frequency selected should be such that the "average power" does not exceed licenced power.

In the US Narrow Band F.M. is on trial on an experimental basis. After a trial of not less than 12 months the matter will be re-examined. The bandwidth is not to exceed that occupied by an amplitude modulated signal of the same audio characteristics. Frequency bands 3850-3900, 14,200-14,250, 28,500-29,000 and 51,000-52,500 kc's.

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# OFF THE RECORD — NEWS & REVIEWS

Most people know the smaller works of Mendelssohn, his violin concerto, and his Messiah. Not so well known are his symphonies, which although not written in the "grand manner," have all the qualities of Mendelssohn's grace and style.

By JOHN MOYLE

**SYMPHONY No. 4 in A MAJOR, OP. 90 ("ITALIAN"),** Mendelssohn, played by the National Symphony Orchestra, conducted by Dr. Heinz Unger, "War March of the Priests" on eighth side. Decca Z882/5.

All the traditional brightness and melody of Mendelssohn are found in this symphony which isn't played as often as it deserves to be. We must not look for the same characteristics as we do, for instance, in Brahms and Beethoven, whose voices are vastly different. But there are times when we require music which does not call for very much mental exercise. This symphony deals with the lighter things of life, of joy, bright air, and happiness.

In fact, the opening section of the first movement presents an outburst of sheer joy rarely equalled in music. It is the type of thing Mendelssohn does so superlatively well—so much so that one wonders whether it was the "raison d'être" for the complete work. It breaks upon us in a mood of glad abandon and glittering excitement—a mood which the orchestra has captured to the full.

The recording is a good one. I liked the quality of the bass response, and there are plenty of nicely balanced highs which will show up well on a good machine. It is of the f.f.r.r. type, although the full range is not so evident as it is in some others released lately. The characteristics of the recording chamber provide a well-judged

reverberation, without prejudice to clarity. Although the first movement is on the whole most successful, the performance is fairly consistent right through, and you will like it.

**BASSOON CONCERTO IN B FLAT, K191 (MOZART),** with soloist Fernand Oubradous. HMV EB299-390.

I have remarked before on the amount of good music contained in these little side-lights of the Mozart output. This concerto is another fine piece of work, all the more interesting because of the highlight it gives to an instrument not often heard except as part of the orchestra itself. So far I have only heard the second side, but it is enough to place an approving seal on the release as a whole. Convention considers the bassoon as a somewhat drunken instrument, valuable when humorous and comic effects are called for. That's a libel, as it can be very beautiful when played well, and you need have no worries on that score.

**"BE THOU FAITHFUL UNTO DEATH"—"Where'er You Walk,"** sung by Webster Booth with the Halle Orchestra under Warwick Braithwaite. HMV EB395.

What a versatile tenor is Webster Booth! There seems to be very little he cannot sing, and sing well. Despite his ventures into musical comedy, he has an ideal voice for oratorio, and he sings with a sincerity and ease which make all his work convincing.

The first record of this type I remember was released about seven or eight years ago, and I was then highly impressed with his success in this type of work.

The new record maintains the standard he set in those days. I do not know of any Englishman at the moment who seems likely to do better.

**FLOWER SONG (CARMEN)—BELDNISARIE (MAGIC FLUTE), AR1133. JOSEPH'S ARIA (JOSEPH)—IN NATIVE WORTH (CREATION), AR1134,** sung by Richard Tauber.

Inasmuch as Tauber is a master of his craft, so are these two records the products of a master. It is remarkable how his dual personality manifests itself, when we remember the doubtful efforts he has made from time to time with the popular stuff—although not all of it has been doubtful. To his credit, it must be said that when tackling better-class music, his silly little tricks are laid aside, and his true ability comes to light.

I don't think these are quite as good as some records he has made in the past, although should we expect a man of his age with so many years of singing behind him to maintain such a standard? We should be grateful that there has been so little change in his voice over his recording life. It is fair, therefore, to say that when you hear these, you will hear just what you would expect of one of our generation's finest tenors.

**WITH VERDURE CLAD (CREATION),** sung by Eleanor Steber with the Victor Symphony Orchestra. HMV ED526.

This is a voice of which I think much will be heard in the future, although it is comparatively new to me. Good though the recording is, I should imagine she should be even more thrilling to hear in the flesh. Her quality is even throughout. She has a capacity for volume which is well controlled, and she sings with dignity and restraint.

There is another record to go with this one, the number of which has escaped me. It is "I Know That My Redeemer Liveth." The same comments I make of this record as of the first. Hear them both, and judge for yourself.

**"LET THE BRIGHT SERAPHIM" (Samson),** sung by Isobal Baillie with the Halle Orchestra. DOX882.

Another fine example of this excellent soprano, in a number which suits her admirably.

**BRANDENBURG CONCERTO No. 2 IN F MAJOR,** played by the Boyd Neel String Orchestra. Decca Z886/7.

A splendid piece of work in every way, including that of the soloists with trumpet, flute, violin, and oboe. The visit of Boyd Neel to Australia fully confirmed the opinions already made from hearing recordings—records like these will ensure that such an opinion remains. In the Brandenburg's is found some of Bach's most grateful music—they are a man's life work in themselves.

**DUMKA, OP. 59 (TSCHAIKOWSKY),** played by Vladimir Horowitz. HMV ED522.

There is nothing wrong with the performance, but why choose the music? Maybe it was a personal reaction, but I fancy it must have a great appeal to the Russian rustics to leave me so cold. On the other hand, Horowitz is too fine a pianist to make a poor record. Hear it and see.

**WELSH RHAPSODY (GERMAN),** played by the City of Birmingham Orchestra, conducted by Charles Williams. DOX862.

I thought this a typically German-flavored piece of work well above the average light symphonic efforts we have been hearing of late. That is only to be expected, being written as it is by a man who has very little to learn in this field. Well recognisable tunes are there, in a mixture of plain statement and in body matter put together with imaginative success. The recording is good.

## Other Releases Include—

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# ANSWERS TO CORRESPONDENTS

K.T. (Moruya, NSW) writes to express himself very strongly regarding an opinion from another reader "I.C.S. of Paradise, SA." He feels that "Radio and Hobbies" would be doing the wrong thing to pay less attention to the needs of beginners by cutting down on simple set descriptions and eliminating the profusion of pictures and wiring diagrams.

A. We can quite appreciate your sentiments, K.T., but feel that your counter-measures involving tubs of water and shark bait are rather drastic for the particular circumstance. If you met the other correspondent you would probably compromise for a pot at the local.

D.P. (Moonee Ponds, Vic.) reports having built up "Monty," "Sergeant Major" and "Little Jim II," all with excellent results.

A. We are pleased to note your success with the receivers, particularly with "Monty" on the short-wave bands. We can supply a page of coil winding data through the postal query service which can be adapted for most small regenerative sets with or without an R.F. stage.

A.R. (Buladelah, NSW) thanks us for information given previously in this page and asks about valve types from an ex-disposals transceiver.

A. We are glad to note that the information previously supplied was helpful but are not able to assist you with the valve data. We can only suggest that you seek informa-

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1. Queries will be answered in rotation through the columns of our magazine if not accompanied by a fee for a postal reply.
2. Queries, neatly and concisely set out, will be answered by mail as quickly as possible if accompanied by 1/- in postal notes or postage stamps. Endorse envelope "Query."
3. Back numbers are rarely available but reprints of most circuits, wiring diagrams, and parts lists will be supplied for 6d each, minimum charge 1/-. Thus a circuit, layout, and parts list will cost 1/6 in stamps or a postal note. Endorse envelope "Circuit."
4. Blueprints of exact size chassis layouts with all essential holes and cut-outs will be supplied if available for 2/6. Endorse envelope "Blueprint."

Address your letters to the Technical Editor, "Radio & Hobbies," Box 2728C, GPO, Sydney.

Engineering offers so many opportunities today that the young man who is mechanically minded hardly knows in which direction or in what branch of Engineering to turn his attention.

One recommended branch is **MOTOR CAR ENGINEERING.**

Another recommendation is **DIESEL ENGINEERING . . .**

*We are again making a very special offer of training students—by Correspondence . . . you owe it to your future to get the facts!*

HERE ARE A FEW EXTRACTS FROM STUDENTS' LETTERS, which speak for themselves:—

"I must thank you for helping me. Since getting my certificate my wages have been over £8 per week."

"I must congratulate you on the way you put me through the Motor Course. I have been able to secure a first rate job with the largest garage here."

"It is thanks to your Motor Engineering Course that I am now in the position I hold as Chief Mechanic."

"Thanks to your technical training, I have a good position as Chief Mechanic on a station."

"Eight years ago one of my sons successfully completed your Motor Engineering Course. He then opened his own garage, and has done well. I now wish to enrol two more sons."

"You have done more for me than I can put into words. When I enrolled I was just a Farm Hand. Now I own my own garage."

"I have been appointed Service Manager for the International Harvester Co., for the Northern District.—I thank you."

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Please send me, without obligation, your FREE BOOKLET, "All About Motors," giving details of your CORRESPONDENCE COURSE in MOTOR CAR ENGINEERING, and Special Offer.



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## MOTOR-CAR ENGINEERING

Since 1923 THE AUSTRALIAN TECHNICAL SCHOOLS, 8 Jamieson Street, Sydney, have trained students by CORRESPONDENCE in Engineering subjects with MARKED SUCCESS.



tion from the A.W. Valve-Co., 47 York-street, Sydney, or from Philips Electrical Industries, 69-73 Clarence-street, Sydney.

R.J.M. (Moyhu, Vic.) has a four-valve battery set which recently burnt out all four valves for no apparent reason.

A. It is just possible that the filament of the 33, in fracturing, may have come in contact with the plate and applied a high voltage to the other valves. The 13½ volts grid bias could hardly cause the trouble since there would be a fair impedance in series with the grid circuit. We are more inclined to believe that some fault developed in the switch or the wiring which has allowed more than the normal voltage to be applied to all the filaments.

J.H.G. (Randwick, NSW) is interested in the "Handie Talkie" and asks where he can purchase a cabinet and chassis.

A. It always takes a while for manufacturers to get into production with these items but distributors normally have stock within two to three weeks of the time the design appears in the magazine. By the time you will read this you will probably have been able to purchase what you want.

P.F.A. (Brisbane, Qld.) comments favorably on "Radio and Hobbies" and is particularly keen about the "Handie Talkie."

A. Many thanks for your remarks which were passed on to us by the advertising department.

P.E.I.G. (Butlers Gorge, Tas.) renews his subscription to "Radio and Hobbies" and mentions that he has had quite good results from the "Ferrotune Four" receiver.

A. Many thanks for your letter and the subscription renewal. It is possible that the aerials are sufficiently close together for absorption effects to be evident and the obvious cure is to mount them further apart. We note your remarks about electrical interference but have no immediate intention of running a lengthy article on the subject.

E.J.L. (Armidale, NSW) writes in appreciation of "Radio and Hobbies" and mentions that he has had excellent results with the "1Q5-two" receiver.

A. Many thanks for your letter and your change of address has been noted. Glad to hear of the pleasing results you obtained from the "1Q5-two."

H.A.S. (Rosetta, Tas.) thinks that "Radio and Hobbies" is the best magazine of its kind that he has read and expresses his appreciation for the work which it is doing. He also submits a circuit for comment and correction.

A. We thank you, H.A.S., for your words of appreciation. Your circuit is fundamentally in error, in that it shows attempt to combine a regenerative detector principle with that of the superheterodyne. We suggest that you dispense with the 56 and wire the 2B7 and the 2A5 into a circuit such as the "Tiny Tim Two" which was featured in the April, 1943, issue of "Radio and Hobbies."

R.R. (Glenhuntly, Vic.) renews his subscription to "Radio and Hobbies" and says he would like to see a series of articles published on aerial design and construction.

A. Thanks for your subscription and your request has been noted. We will probably publish material of this nature in the not too distant future.



## ANSWERS TO CORRESPONDENTS

V.H.A. (Perth, WA) reports having built up a tuner using the Ferrotune principle and obtains excellent results from it in conjunction with a commercial amplifier.

A. We read your letter with interest and are pleased to note that you obtained such good results from the set. Despite the fact that the amplifier is apparently of venerable age, this particular combination of valves usually gives very good results.

J.D. (Bowen Hills, Qld.) thanks us for information previously supplied.

A. We are glad to note that the information was helpful and trust that you will continue to find much of interest in our magazine.

I.W.T. (Box Hill, Vic.) forwards for comment a simple two valve circuit employing a 1P5GT and a 1D8GT, which, according to his findings, performs admirably. For the benefit of readers building this type of set he stresses the importance of winding aerial, grid and reaction coils in the same direction.

Also suggests that an octal valve base fits nicely into a cardboard former from a torch cell to make a handy plug-in type coil.

A. Your circuit is quite conventional, I.W.T., though we did notice that wiring of the volume control was a little unorthodox. Your plug-in coil idea would be quite handy as a temporary expedient or for experimental work on small sets. However, for short-wave work where permanent rigidity is required, the commercial coil formers are to be preferred. We are pleased to note the success with those little sets which you constructed and that you find this magazine quite interesting.

M.McL. (Melbourne, Vic.) writes in appreciation of this magazine and suggests a large copy for the Xmas issue. He encloses a "Young Albert" poem entitled "Albert's Amp."

A. Thanks M.McL. for your words of appreciation. Your poem of "Albert's Amp." strikes a humorous note.

B.G. (Parrakie, SA) writes to tell of his interest in model planes.

A. Many thanks for your letter and we are pleased to note that you have had success with the simple stick model.

J.S. (Kensington Park, SA) writes in appreciation of the magazine and suggests including a series of articles on R.F. coil and I.F. transformer design.

A. Thanks J.S. for your suggestion. We feel, however, that advanced articles on the design of components are rather outside the scope of the magazine, particularly when such components are readily available on the commercial market at a reasonable price. Should it ever be necessary and practicable for readers to design and build special coils and I.F. transformers, we would be quite happy to publish the necessary information.

D.H.A. (Mitchem, Sth. Aust.) would like to see a circuit along the lines of the Little General but arranged for operation from 240 volt DC mains. He also makes mention of pleasing results from the "Little Jim's Mate" and the "1Q5-One."

A. Very pleased, D.H.A., to hear of your success with these little sets. There are a number of points against publication of a DC circuit so that, up to the present, we have avoided it. Circuits of this type are liable to be a source of danger for the beginner. This, coupled with the scarcity of suitable types of valves and lack of ready means for testing such a set, has deterred us from following along that line. However, the August, 1942, issue of "R. & H." carries an article on the design of DC mains receivers with suitable mention of the points to be watched regarding safety. You may be able to obtain a copy of that issue by advertising in the "Wanted to buy or exchange" column.

C.R.M. (Gympie, Q.) writes in appreciation of "Radio and Hobbies" and encloses a circuit for comment.

A. Many thanks for the nice remarks. We are glad to hear of your success with "Radio and Hobbies" circuits. The circuit is okay and follows conventional practice.

## BIG PROFITS IN TOYS AND DOLLS

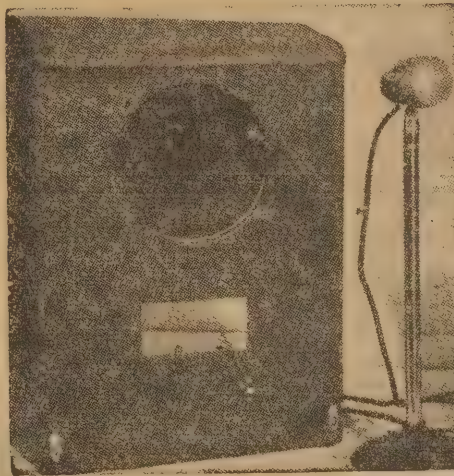
Special Postal Course in soft toy craft. Course includes patterns for lovely dolls and cute animals. All materials available. Start home business. Full or part time. Send stamp for FREE BOOK, "Modern Money-Making Crafts." Dept. B, Le Bon College (Regd.), Box 279 Haymarket, Sydney.

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# Homecrafts

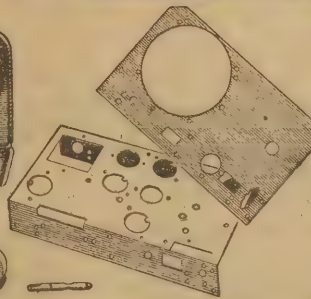
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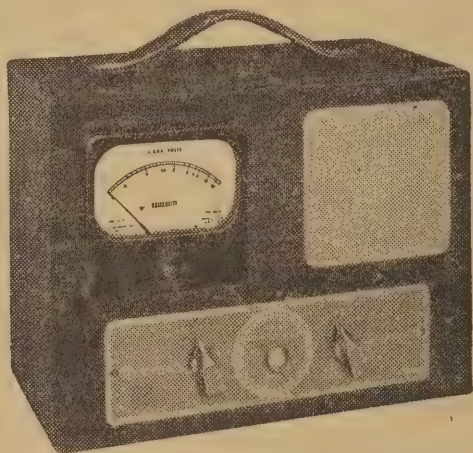
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Here are four "must have" instruments to put a gleam in the eyes of many radio enthusiasts and servicemen. Any one of them can be yours this Christmas for an extremely low and reasonable sum.

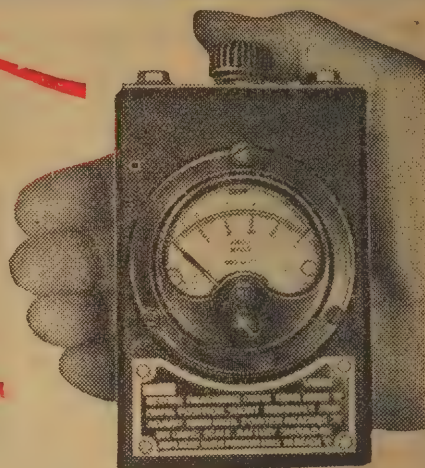
#### New OK1 Oscillator Kit (right)

Designed to give years of accurate service, yet simple to build at home with a few ordinary tools, the new University OK1 oscillator kit covers all fundamental frequencies in the average receiver. Dial is specially calibrated. Kit uses standard batteries. Every OK1 kit is complete with instruction book giving pictures and wiring diagrams, and all parts. Price, £7/10/- (plus tax).



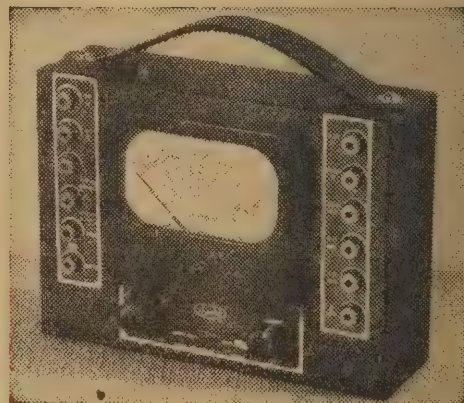
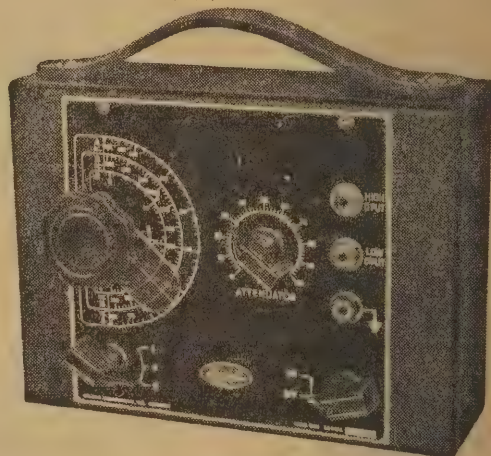
#### Model STB Signal Tracer (above)

Tracing the signal RIGHT THROUGH the radio receiver from start to finish, the new "University" S.T.B. Signal Tracer makes fault finding easy and quick. When the probe strikes a faulty section, indications are given on both meter and speaker. Portable—light—sturdily constructed, the S.T.B. is the versatile post-war service instrument you MUST have. Price, £14/- (plus tax)



#### THE VRM TESTER (above)

This handy, pocket-size tester speedily and conveniently checks voltages and circuits. The VRM is a voltmeter with several ranges combined with an ohm meter. Sensitivity is 1000 ohms per volt. Features  $2\frac{1}{2}$ " meter and clearly calibrated multi scale. Price £4/10/- (plus tax).



#### Model Mk1 Multimeter Kit

Handy companion to Model OK1 and same neat size—6in. x 8in. x  $2\frac{1}{2}$ in. Uses popular 4in. square type meter with clear multi scale. All wiring instructions and constructional details are given with the kit and photographs and circuit diagrams make assembly simple. All parts are prefabricated so that fitting is easy. Price, £7/12/- (plus tax).

# University

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#### SPECIFICATIONS:

16-17 Cycle Magneto Generator,  
1000 Ohm Bell,  
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Case, Metal, Desk Type,  
P.M.G. Type Induction Coil.

This unit is suitable to connect on P.M.G. or party lines.

Priced at **£4'5/-**  
plus 2/- packing.

### Push-Button Call Bell or Buzzer Type

This type is suitable for inter-office, room to room or between floors, where distance does not exceed approx. 300', but is not suitable to connect to P.M.G. lines. These are also fitted in metal case.

Priced at **£3'7'6**  
plus 2/- packing.

Both above types are finished in Flat Black, but we can finish in baked DULUX all other colors as selected at extra cost of 15/- per unit.

### Motors

Limited quantity of Exploder Motors converted to 240-volts A.C. at 55/-, few other fractional H.P. Motors from 1/25 h.p. to 1/8 h.p. all variable speed, priced from £3/10/-. Forward particulars of size and requirements.

### Crystal Sets

Complete Kit of Parts, including Head-phones, Circuit Diagram and Instructions ready to assemble, 57/6.

NOTE: Cash with all orders. We DO NOT SEND C.O.D., please add postage, or we will forward freight on to nearest Railway Station.

## ANSWERS TO CORRESPONDENTS

K.M. (Camberwell, Vic.) writes in appreciation of "Radio and Hobbies" and suggests that we should run a series of articles on the principles of transmission and transmitters.

A.: Many thanks for your letter and your suggestion, K.M. We did run such a series of articles a couple of years back and doubt whether we would be in a position to run the series again so soon. The big problem at the moment is that restricted space would make it necessary to keep each instalment relatively brief, with the result that the series would extend over a period of a couple of years. Until we can do better than this we can only suggest that you follow the usual course of purchasing one or other of the amateur Radio Handbooks, and studying the subject from them.

R.G. (Coff's Harbor, NSW) writes to ask where he can obtain a chassis for the "IK5-tour" receiver.

A.: The design for this chassis was supplied to manufacturers so that it should be obtainable on order in the normal way. However, supplies of chassis have been somewhat limited in recent months by material and labor shortages.

J.R.D. (New Zealand) asks some questions about the three valve superhet described in the "Reader built it" page of the May, 1947 issue. He also asks about the possibility of describing a similar set at some future date.

A.: Either the first or the second diode of the EBLI may be used or the two diodes may simply be connected together. A speaker transformer which will match 7000 ohms to the voice coil impedance is required for the EBLI pentode portion. With regard to describing a similar set in the magazine, we cannot make any promises, J.R.D., but will keep your suggestion in mind.

R.B.W. (Geelong) sends his good wishes for the success of the magazine and wants to know whether copies containing details of the Amateur Junior receiver (with or without B.F.O.) are available.

A.: Thanks for your good wishes, R.B.W. We regret that we have no copies of the April or August, 1946, issues available. However, copies of the circuits for the "Amateur Junior" receiver are available from our files.

A.B. (Cairns) wants to know if the "1947 Advance" would give good results with a pick-up and what would be a suitable method of attachment.

A.: The audio portion of this set is quite suitable for use with a pick-up, A.B., and a circuit diagram, showing a suitable method of attachment is being prepared for publication.

R.G.M. (Coogee, NSW) comments on our recent editorial regarding conditions in the radio trade.

A.: As you say R.G.M. the talk of frequency modulation must have an unsettling effect. However, we are not over impressed by the possibilities of a super-regenerative tuner for high quality P.M. receivers.

C.A.R. (Five Dock, NSW) renews his subscription to "Radio and Hobbies" and says that he is building a version of the "Communications Nine."

A.: Thanks for your subscription and we would certainly be interested to know what results you get from this set. We are glad to note also that the Service Oscillator is showing such promise.

C.H.B. (Rockhampton, Q'land.) renews his subscription to "Radio and Hobbies" and comments on the high prices of some radio components notably valves.

A.: We have already expressed ourselves in the right quarters about the duty on valves, but so have many others. We are glad to note your success with the receivers and the particular satisfaction you have obtained from the 42/43 Standard.

F.O.D. (Bexley, NSW) asks whether the "Tom Thumb" receiver is to be issued in kit form.

A.: This is purely a matter for our advertisers who are in turn influenced by the parts position. We note your suggestion regarding the short-wave notes.

Mr. L. J. Hallam, 308 Dawson-st., Ballarat, Victoria, gives us an account of results obtained from a small set which he constructed, covering from 5 metres to half the broadcast band.

A.: We read your letter with interest, L.J.H., and can see reason for your keenness for your particular set. Although we feel that the circuit is of the usual type and carries no outstanding modifications, any reader so desiring may obtain information on this set by sending a stamped addressed envelope to Mr. Hallam of the above address.

W.M.F. (Maitland, NSW) writes for a copy of our "Short-wave Handbook" and makes appreciative reference to articles in "Radio and Hobbies."

A.: Many thanks for your letter and a copy of the Call Sign book has been forwarded to your address.

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**FOR SALE:** 3" Ferguson Cathode-Ray-Scillograph. What offer, as new, must sell, J. Billing, Grey St., Mt. Gambier, S.A.

**FOR SALE:** "Healing signaliser with instructions. Little use. £16 plus freight. E. Wellard, 106 Fitzroy St., Tamworth, N.S.W.

**FOR SALE:** D.104 Crystal Mike, £7. Guaranteed perfect order. G. C. Robe, 28 Victoria Street, Warragul, Vic.

**FOR SALE:** "Modern Radio Servicing," by Ghirardi. New condition, 30/-, W. S. Munn, 19 Bourke St., Adamstown, N.S.W.

**FOR SALE:** Little Jim: complete with batteries, valve, cabinet, less phones. £3. Freight paid. N. Johnson, 17 Nish St., Echuca, Victoria.

**FOR SALE:** 1K5-4 valve wireless, less cabinet and batteries. Valves new. Price £14. M. Guley, Box 5, Beulah, Vic.

**FOR SALE:** Bendix frequency meter, for 125 to 20,000 kilocycles, almost new, perfect order, complete with calibration charts, very accurate instrument, £45, or near offer. Ian L. Jones, Woombye, North Coast Line, Qld.

**FOR SALE:** Five valve auto wireless, one unit. Suitable glove box, fitting Ford. Excellent condition, gas filled vibrator, screened aerial and battery cable, complete £30. T. Fox, Myuna, Collinsville, Qld.

**FOR SALE:** Valves—6SK7, 6B (new) 15/- each. 6H6, 6V6G, 6C8G (used once only) 10/- each. R. Rooke, 7 "Three Flats, Eustace Street, Manly. XU2056.

**FOR SALE:** 1 new synchronous electric motor, can be used as a converter. D.C. 110 volts, 50 watts, A.C. 200 volts, 700 r.p.m., size approx. 15 x 7 inches. Mannerling, "Sunshine," Hazelbrook, Blue Mts., Price £15.

**FOR SALE:** One 1 valve battery set, complete except battery, also old tpe cone speaker, £5/10/-, or exchange for grammo & pickup. 4 valve mantle, new, in going order, £17/-, Apply, J. B. Dowle, 54 McAdam St., Maffra, Vic.

**FOR SALE:** R & H 6v. 5 watt Vibrace Vox amplifier with speaker, turntable, P.V. Price, £16/10/-, or will exchange for Rola G12 speaker. Cash adj. Write for details. D. F. Bowditch, Canyon-Leigh P.O., via Moss Vale.

**FOR SALE:** One miniature petrol engine, "Vanguard Pup," 6-7cc capacity, in very good order, suit model speed boat, race car. Complete with coil, plug, condenser & flywheel. £5. D. Clark, 391 Armidale Rd., Tamworth, N.S.W.

**FOR SALE:** 1 Army 101 transceiver complete. £7/10/- or offer. 8 valve. 1 AVO Minor pocket Multimeter, res. AC-DC-MA. £5/-, 1 Weston Mod 697 Res. AC-DC-MA in leather case. £6/-, L. W. Adams, 18 Chelaston St., or ring Cam, 270.

**FOR SALE:** Miniature portable communication receiver. "Commando" M.C.R.1. 5 valve, 150kc to 16mc continuous. Selectivity, reaction and aerial controls, vernier dial. Complete with all coils, new battery and earphones. Brand new, £12/10/-, or near offer. G. Lavek, Fish Creek, Sth. Gipps., Victoria.

**FOR SALE:** 108 mk II transceiver, complete with valves, earphones, microphone, etc., in first class order, £5. 8" Rola P.M. speaker, £1. Hi-Fi output transformer, 3000 ohms c.t. to 500 ohm, £1/5/-, Brand volumes QST 1930 to 1938. R. & H. Vol 1, Nos. 1 to 5. What offers? 5 valve, superhet receiver, 80 mx band only, complete with valves, £5. VK3PR, Box 52, Leongatha, Vic.

**SALE:** 60 mill power transformer. 335, 5, 6 volt windings. 6 inch Permag speaker, with 15,000 transformer. N. Napper, Nimbin, N.S.W.

**SALE:** FSG transceiver, tuned 40m, new cond. Comp. with all leads, power supply, phones, mike, key, also comm. rec. and power supply, suit ham reg. battery charger, other parts, write details. A. V. Payne, P.O., Wyong, N.S.W.

**SELL:** A gas-model aeroplane with engine. 5ft wingspan; perfect condition, £12 or offer. A. Mason, 99 Great Nth Rd., Fivedock.

**SALE:** 1 5 valve electric mantel radio, good condition, £12. 1 spring gramophone motor and turntable, also H.M.V. Pickup complete, £5. 1 H.M.V. Pickup, new, £2/10/-, 1 power transformer, 240v. primary, 285v. secondary, £1. 1 2 volt "Clyde" battery, 15/-, R. J. Maconachie, "Sunny Park," Barham, N.S.W.

Readers wishing to buy, sell or exchange goods are invited to insert an advertisement on this page. The cost is 9d per line; minimum charge 2/3. Approximately 6 words to a line. Advertisements for the next issue must reach our office by **WEDNESDAY, JANUARY 14, 1948.** Dealers' advertisements not accepted.

**SELL:** "Palec" VCT/V valve and circuit tester, £25. Mackie, Woodenbong 45, N.S.W.

**SELL:** PK3 portable receiver. Good order, less 1 valve (1D8GT) and batteries, £5. S. Duffill, 29 Ariadne Street, Maryborough, Q.

**SELL:** Pair American earphones, complete with rubber earmuffs, 2000 ohms, £3/10/-, 60 watt, 240v-110v. transformer, £1. 0-500 D.C. milliammeter, 12/6, valves, 10/- each, 6U7G, 6B6G, 6C8G, 6D8G, 6F6G, 6A8G, 6C6G, 6A7G, 6X5GT, 1Q5GT, 5Y3GT, 6V6GT, 6BF2GT, 955, 9002, 9003, 6SJ7MT, 6SSMT, 6NTMT, 6F6MT. Mr. P. F. Ahen, Postal Services Branch, G.P.O., Bris., Q'land.

## ANSWERS TO CORRESPONDENTS

K.F.O. (Marion, NZ) is interested in the "Duplex Single" coils referred to in the June, 1939, issue.

A. To the best of our knowledge, no coils are marketed in Australia nowadays under that name but you can use a commercial Reihartz coil in almost any of these small receivers. Alternatively we can supply a page of coil data through our query service which will allow you to wind up coils for yourself. Circuits, wiring diagrams, and parts list for almost any of our sets can be supplied through the query service at a charge of sixpence per item.

V.O.B. (Whyalla, SA) renews his subscription to "Radio and Hobbies" and asks whether a 7-pin vibrator can be used in the "Vibra-five" receiver.

A. Thanks for your subscription which has duly been added to. The "Vibra-five" requires a split-reed synchronous vibrator and you can use any cartridge of this type wound for 8-volt operation. If a single-reed vibrator is used the back bias system would have to be eliminated, earthing the reed to the vibrator case and supplying an additional 1.5 volts bias to the output grid from a torch cell.

E.L.D. (Oatley, NSW) thanks us for assistance rendered through the postal query service but says that there is still a considerable amount of hum in his receiver.

A. The chances are that the inductance of the filter choke you have installed is lower than that of the field, allowing the hum level to rise. The only possible course of action would be to use a higher quality choke or to increase the capacitance of the filter condensers. The "plop" which is evident when the set comes on is doubtless due to the oscillator beginning to function and this may be due to either the converter valve itself or to the operating conditions which do not allow it to operate until the cathode has reached its full temperature. Make sure that the oscillator grid current is normal and see to it that the full permissible oscillator anode voltage is applied. Otherwise it seems a case for a new converter valve or oscillator coil. Personally we would not worry overmuch about the effect.

W.C.T. (Malacca, Malaya) thanks us for advice given through the postal query service.

A. We are glad to note that our remarks were helpful to you. Glad also to note that you receive "R. and H." regularly and find much of interest in it.

K.B. (Port Melbourne, Vic.) wants some data on the 866 Jnr. type rectifier.

A. The information on this valve type is contained on page 459 of the particular handbook of which you make mention. The base connections are:—Pin 1 filament, pin 2 plate, pin 3 no connection, pin 4 filament. When wired for full-wave rectification, the operating conditions are 1250 volts at 250 mA. per pair for choke input filter. The filament of each valve requires 2.5 volts at 2.5 A.

**SELL:** One small 110 volt American receiver, recently fitted new valves, £6. McCullough, Gympie Terrace, Tewantin, Qld.

**WANTED to buy:** valve No. 32L7. L. Huckle, 41 Campbell St., E. Kew, Melbourne, Vic.

**WANTED:** Will pay good price for handbook on American receiver, type BC-225, E. J. Gilmore, State Land Tax Dept. Brisbane, Q.

**WANTED:** S. hand, single-phase 240v induction motor, approx. 1/4 h.p., in good condition. G. Stenhouse, 46 Were St., Brighton, Victoria.

**WANTED:** Collard pickup, complete with auto stop arm. G. F. Smith, 2 Wakehurst Flats, Victoria Pde., Manly.

**WANTED:** One or two valve set, less phones and batteries. Must be in perfect condition. C. Ralph, 14 Fermoy Ave., Northam, W.A.

**WANTED:** 3Q5GT valve in good order. State price. E. Wellard, 106 Fitzroy St., Tamworth, N.S.W.

**WILL EXCHANGE** 2-14H7, 1-14J7 1-14R7 with lockal sockets for 0-1 in A meter with calibrated dial, or for 6B6, 6P6 and GT. primary transformer. Please reply to D. Colmum, 54 South St., Ipswich, Q'land.

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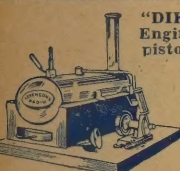
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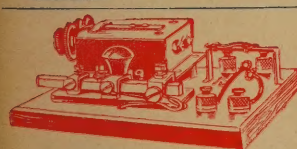
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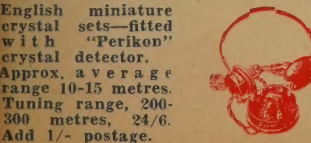
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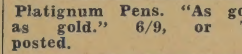
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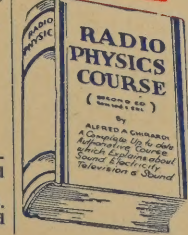
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